

Rationale

Much of the basis for regional and community partnerships is described under Actions Common to All Alternatives.

Strategies

In addition to those strategies listed under Actions Common to all Alternatives affecting this program,

- Enhance our existing collaborative relationships, and seek additional ones, to increase the likelihood of meeting natural resource mandates and objectives.
- Participate in regional and local community economic development and conservation partnerships and initiatives.
- Facilitate demonstration areas on the refuge and on other conservation lands that showcase applied management to benefit natural resources.
- Enhance the volunteer program to better assist with accomplishing refuge projects
 - * Develop a refuge volunteer plan and handbook that covers volunteer program coordination, training, job descriptions, volunteer policy, recruitment policy, monitoring, evaluation, dispute, and termination policies.
 - * Explore the possibility of constructing a bunk house or other similar type housing for interns and volunteers to support the refuge's biological and public use programs.
 - * Expand the resident workcamper volunteer program.

Climate Change and Sea Level Rise Adaptation Rationale
The rationale is the same as stated above under objective 6.1.

Sea Level Rise and Climate Change Strategies

- Work with Federal, State, and conservation organizations on land acquisition priorities.
- Enhance existing and develop new partnerships to conduct research related to fish and wildlife adaptation to climate change and sea level rise on the refuge, in neighboring watersheds, and elsewhere in the State of Delaware.
- Within 1 year, establish a cooperative agreement with the Delaware Coastal Program on research and monitoring needs for the refuge.

Alternative C. Historic Habitat Management

This alternative emphasizes a return to habitat management programs that were conducted on the refuge through most of the refuge's existence, but which were stopped in recent years for a variety of reasons. These historic habitat management programs include the use of cooperative farming in upland refuge fields, and management of freshwater wetland impoundments, both conducted for the benefit of migratory birds. In 2006, a lawsuit against the refuge charged that farming was being conducted on the refuge without having been properly evaluated through NEPA and a compatibility determination. In 2009, the refuge was ordered to cease farming until the practice could be properly and transparently evaluated during the CCP process. Thus farming has not been a part of recent refuge management, but is evaluated as a component of this alternative.

Similarly, management of freshwater impoundments was conducted on the refuge from the early 1980's, until 2009. Breaches along the refuge shoreline introduced full tidal flow of salt water into the impounded refuge wetlands, converting the freshwater wetlands into brackish/salt marsh and large expanses of open water and prohibiting freshwater impoundment management as conducted previously. As described in chapter 3, the freshwater impoundments at the refuge were successful at providing quality foraging and roosting habitat for migrating and wintering waterfowl. However, as outlined in that same chapter, significant obstacles must be overcome in order for these impoundments to be managed into the future as they have in recent decades. Significant environmental, physical, and structural changes and management actions would need to be addressed to return to freshwater impoundment management on the refuge, and those strategies are outlined within this alternative.

When the Service installed its water management structures in 1988, it utilized the existing east-west roads through the marshes to the barrier island to form the barriers to open water movement. On several occasions the State redistributed sand on the barrier island without bringing in any supplement sand, and on one occasion, brought in a small amount of sand. These approaches were successful in maintaining the integrity of the barrier, even as it continued to erode from the bayside, see Chapter 1. As indicated at the beginning of this Chapter, under Actions Considered by Eliminated from Detailed Analysis, the approach of redistributing the sand on the barrier, is infeasible because there is not enough sand to effectively maintain an intact barrier and prevent salt water from entering the impoundments. As soon as salt water enters the impoundments in sufficient quantity, salt intolerant vegetation dies. Therefore, to be robust enough to last through most anticipated storms, a major beach engineering approach will be required.

Under this alternative, public use programs would be modified somewhat from current management, but not as extensively as in Alternative B. Compared to alternative A (current management), for visitor services programs and refuge uses, alternative C would expand opportunities for hunting and have a greater emphasis on public outreach and education. Fishing, wildlife observation, and wildlife photography would be similar to alternative A (Map 4-25). Compared to alternative B, proposals for hunting in alternative C would decrease the amount of hunting areas and opportunities.

Under alternative C, we would further enhance local community outreach and partnerships, continue to support a friends group, and continue to provide valuable volunteer experiences. We would also promote research and the development of applied management practices through local universities to sustain and enhance natural composition, patterns and processes within their range on the Delmarva Peninsula.

Staffing levels would be similar to alternative A (current management).

To reduce repetition, much of the objectives and rationale explained in earlier sections (actions common to all alternatives, alternative A, and alternative B) are relevant to alternative C, but are not included here.

GOAL 1.

Barrier Beach Island and Coastal Salt Marsh Habitats

Manage, enhance, and protect the dynamic barrier beach island ecosystem for migratory birds, breeding shorebirds, and other marine fauna and flora. Perpetuate and restore the biological integrity, diversity, natural sustainability, and environmental health of North Atlantic high and low salt marsh habitats.

The objective of traditional beach nourishment is to protect the shoreline from storm damage or to stop erosion.

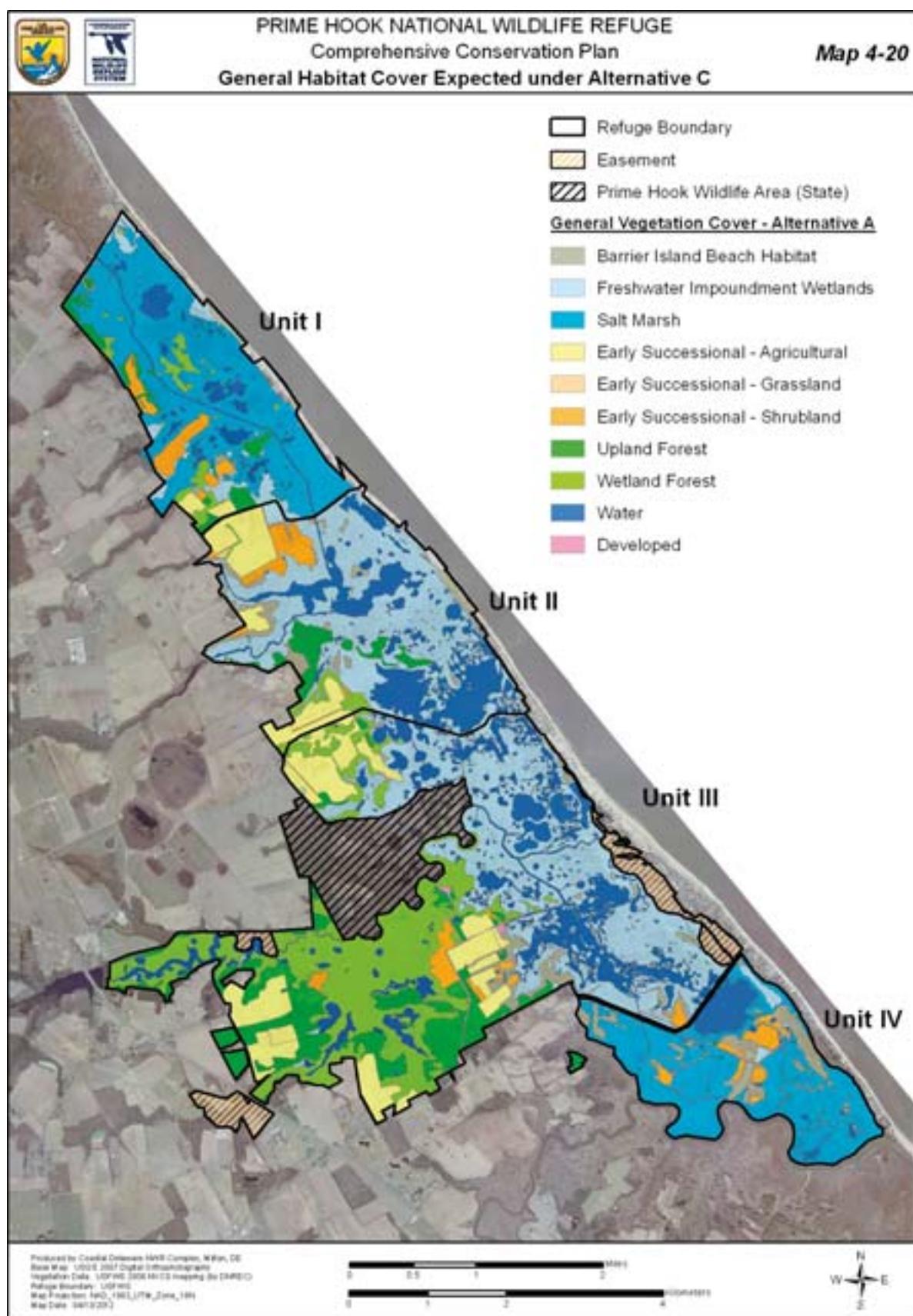
The USACE sediment replenishment projects are those which are designed to add sand to beaches.

Beach replenishment actions designed to maintain prior beach profiles are commonly conducted by the U.S. Army Corps of Engineers (USACE). The (USACE) describes beach nourishment, also referred to as beach replenishment, as a process by which sediment (usually sand) lost through longshore drift or erosion is replaced from sources outside of the system and is deposited on an eroding beach. Nourishment is typically a repetitive process, since nourished beaches tend to erode faster than natural beaches, due to the sediment deficit of the area, the lack of established beach grass and vegetation to hold the sand in place, and the fact that most beach nourishment projects are placed too far seaward due to existing construction on the beach. DNREC does not conduct this sort of beach nourishment on state owned natural beaches. (DNREC 2004) Since the barrier beach along the eastern boundary of the refuge is not backed by houses, it is not imperative for it to be replaced in the exact same alignment as the current beach, but even if it were to be placed somewhat inland of its current alignment, given the erosional forces and sea level rise, any such project will still require substantial quantities of sand both to form the new barrier and to regularly replace the material that is lost to erosion.

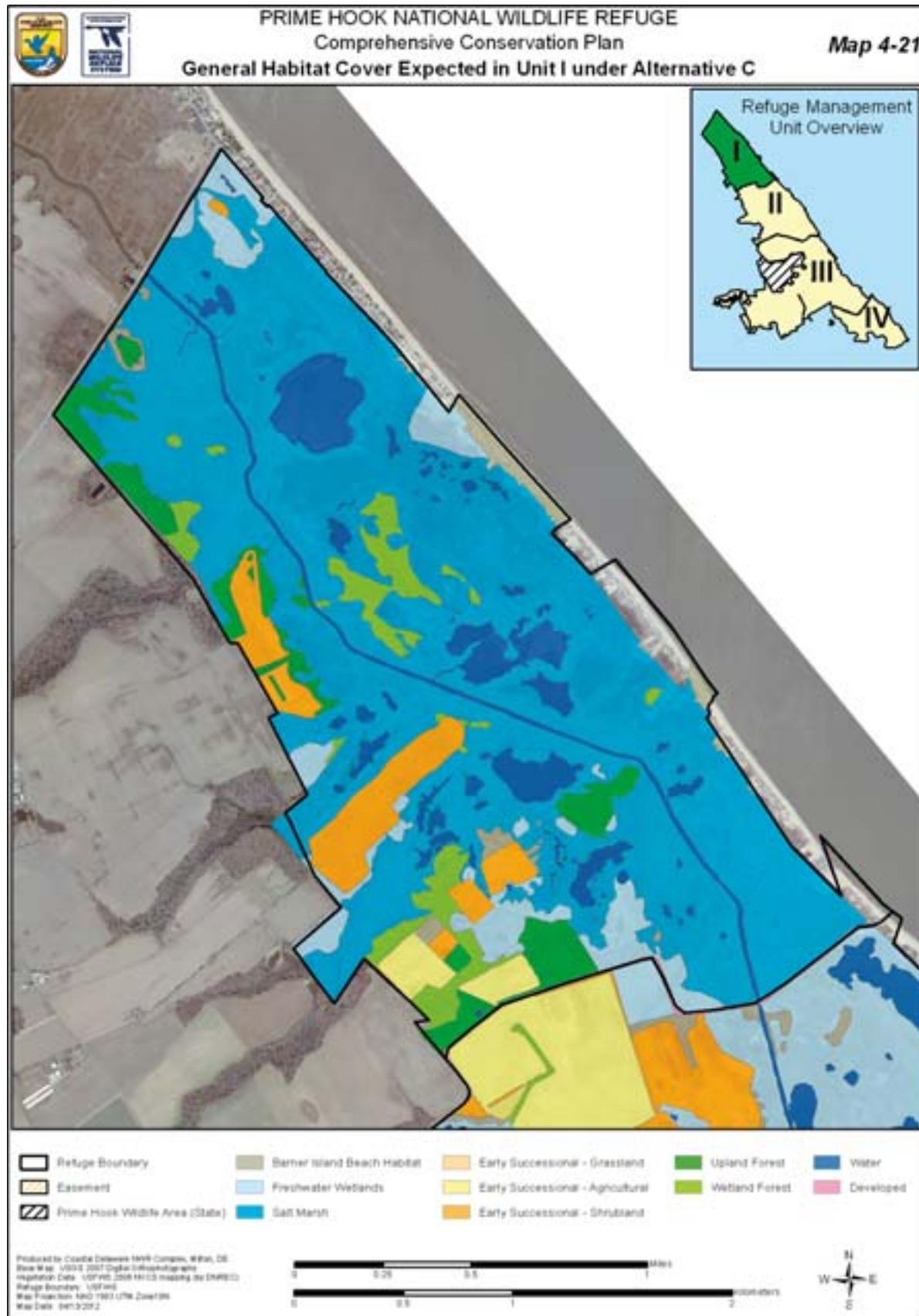
Like icebergs, a barrier beach contains a relatively small amount of its structure above water. The subsurface extent of the barrier island extends substantially off-shore and the gradual slope of off-shore sediments both serve to ‘feed’ the visible beach face and to dissipate wave energies, thus protecting the beach and dune from erosion. Typically, the amount of submerged sand (in an offshore bar) eroded is much greater than the amount of visibly missing sand onshore (sandy beach face). Nourishing a beach that has little submerged sand requires addressing the reason that the submerged sand is missing. Replacing only the visible sand is insufficient without replacing the sand off shore that supports any accretion process to maintain the dune and beach naturally. If insufficient sand is placed on the upper beach without extending the supplemental sand over a substantial amount of the subtidal area, the beach is unstable and the visible sand quickly erodes (Psuty 2004). Thus, in any planning phase of a beach nourishment project, it is important to develop an accurate understanding of the local sediment budget. Knowledge about the sediment budget and natural sediment movement provides a framework for understanding the complex coastal processes that take place in the vicinity of the project area. (NOAA 2011).

The refuge’s sandy beach habitat is representative of a microtidal, wave-dominated, barrier formed along the Delaware Bay’s sandy coastline with a tidal

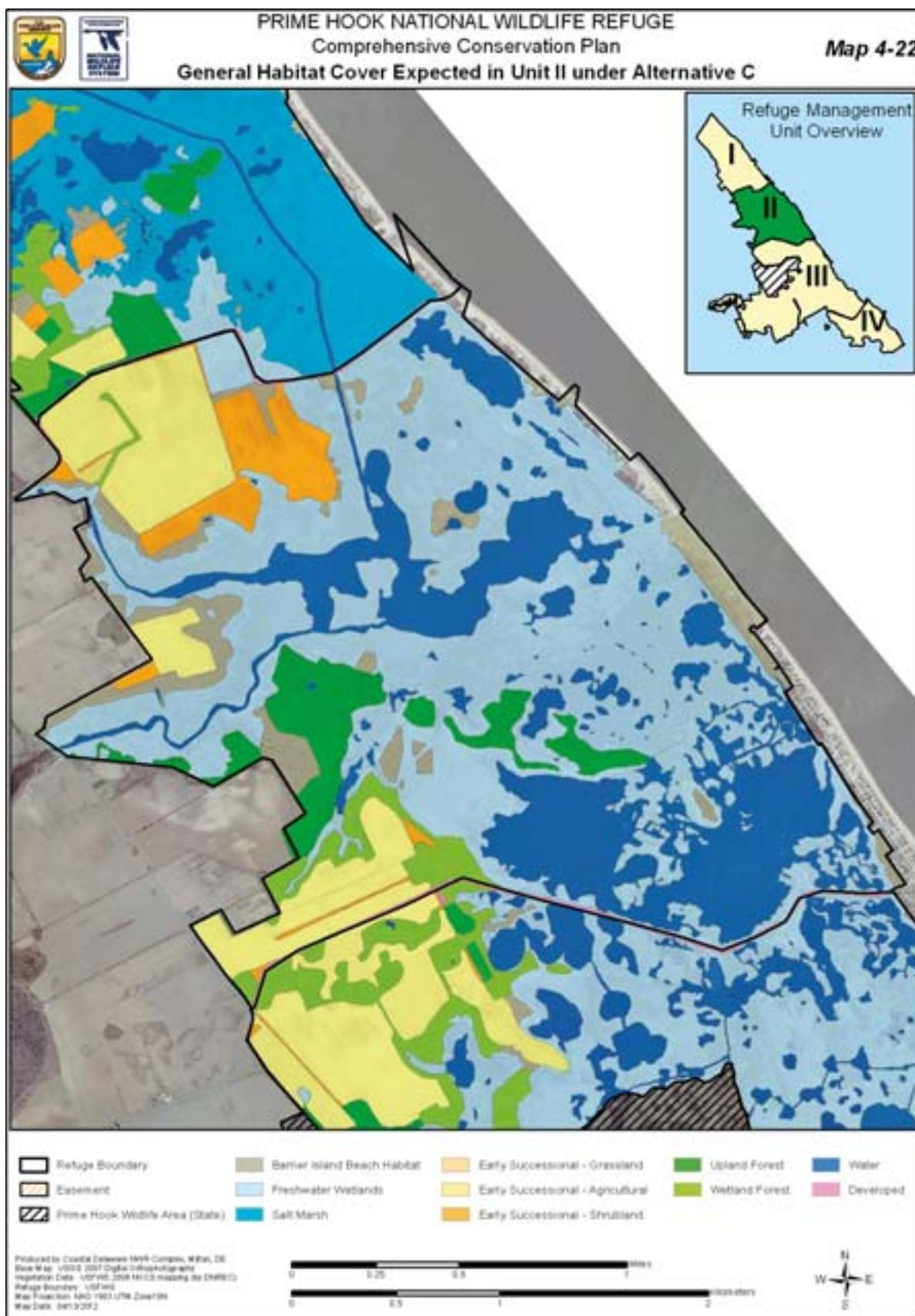
Map 4-20. Overview of general habitat cover under alternative C



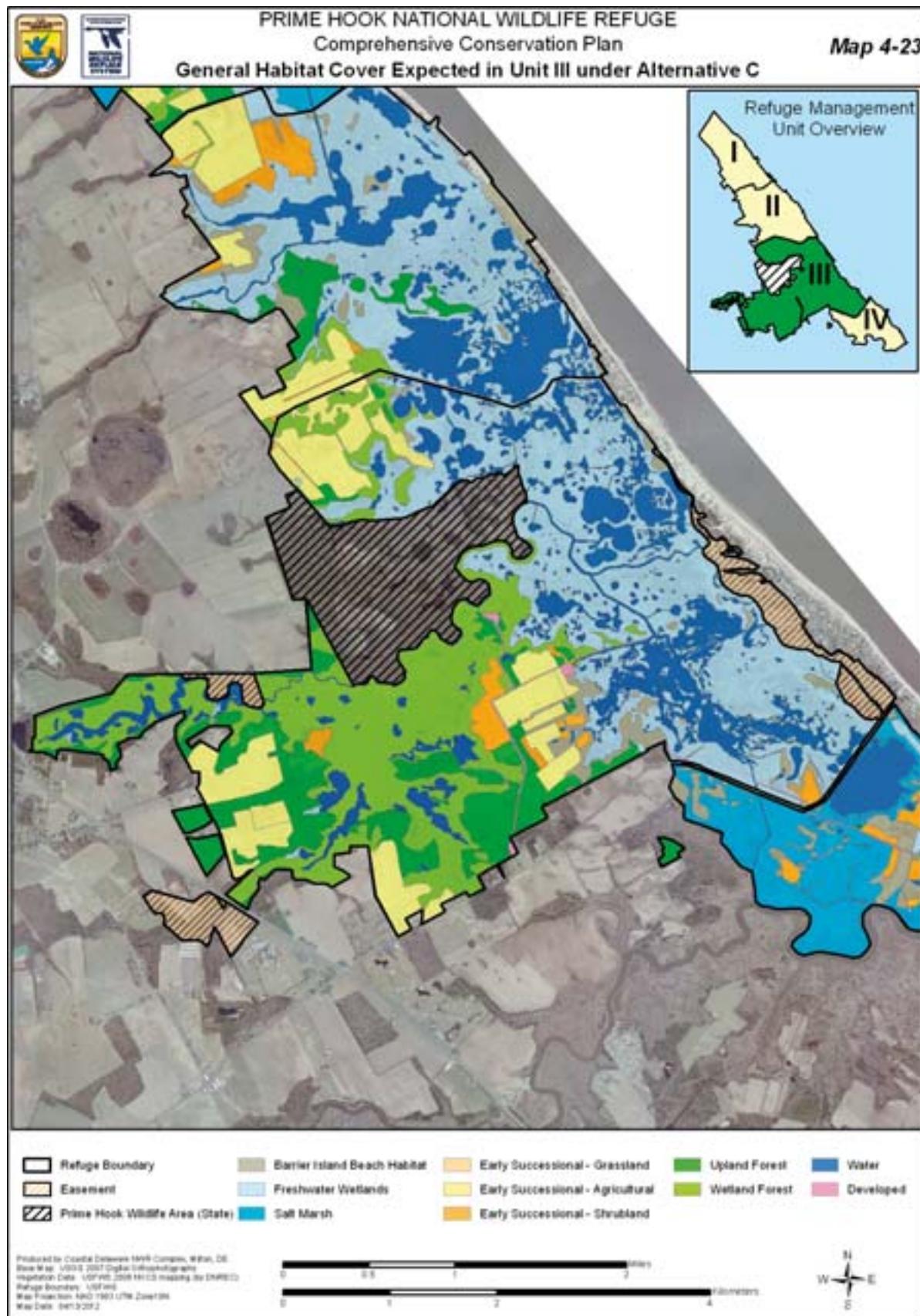
Map 4-21. General habitat cover in Unit I under alternative C



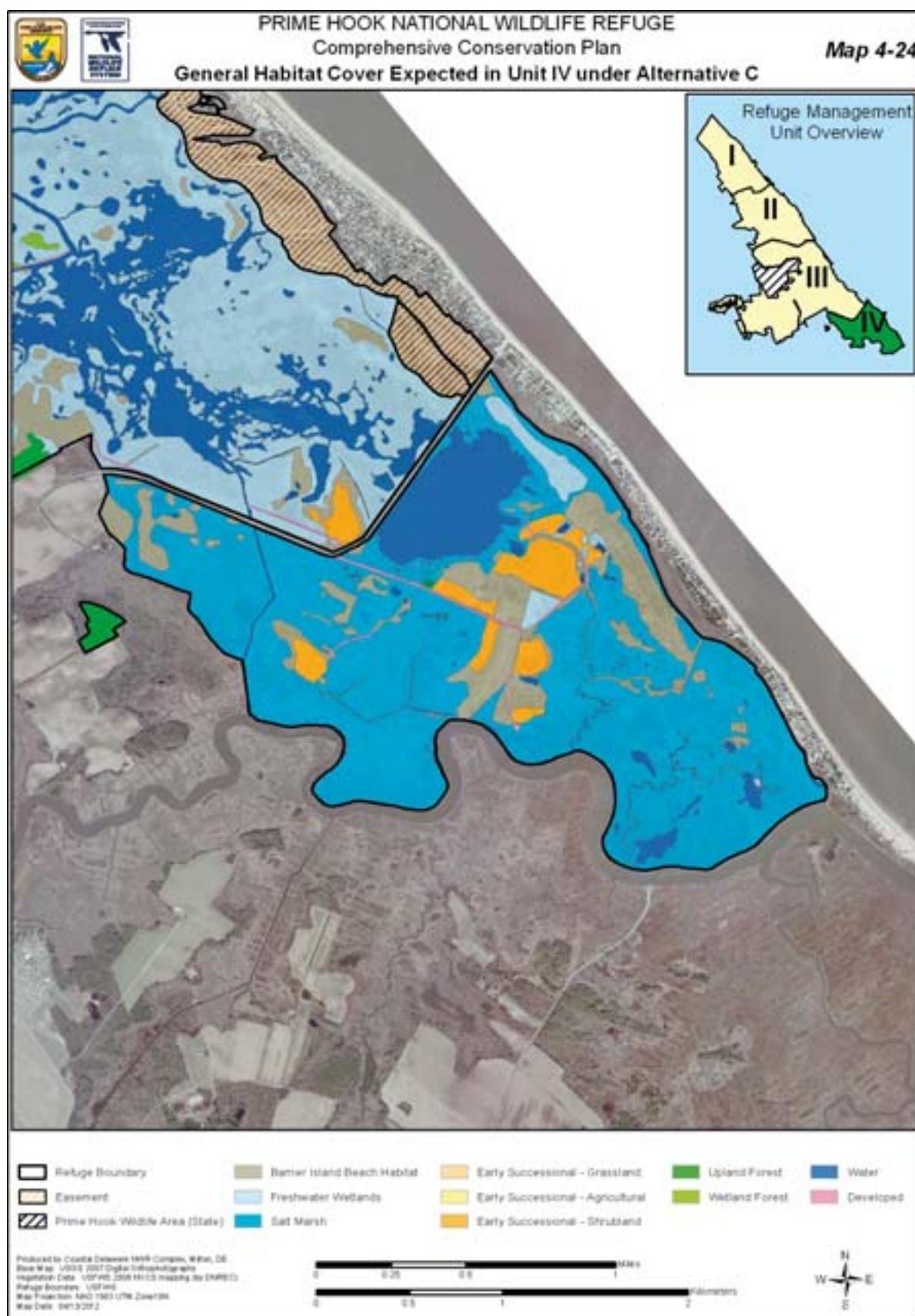
Map 4-22. General habitat cover in Unit II under alternative C



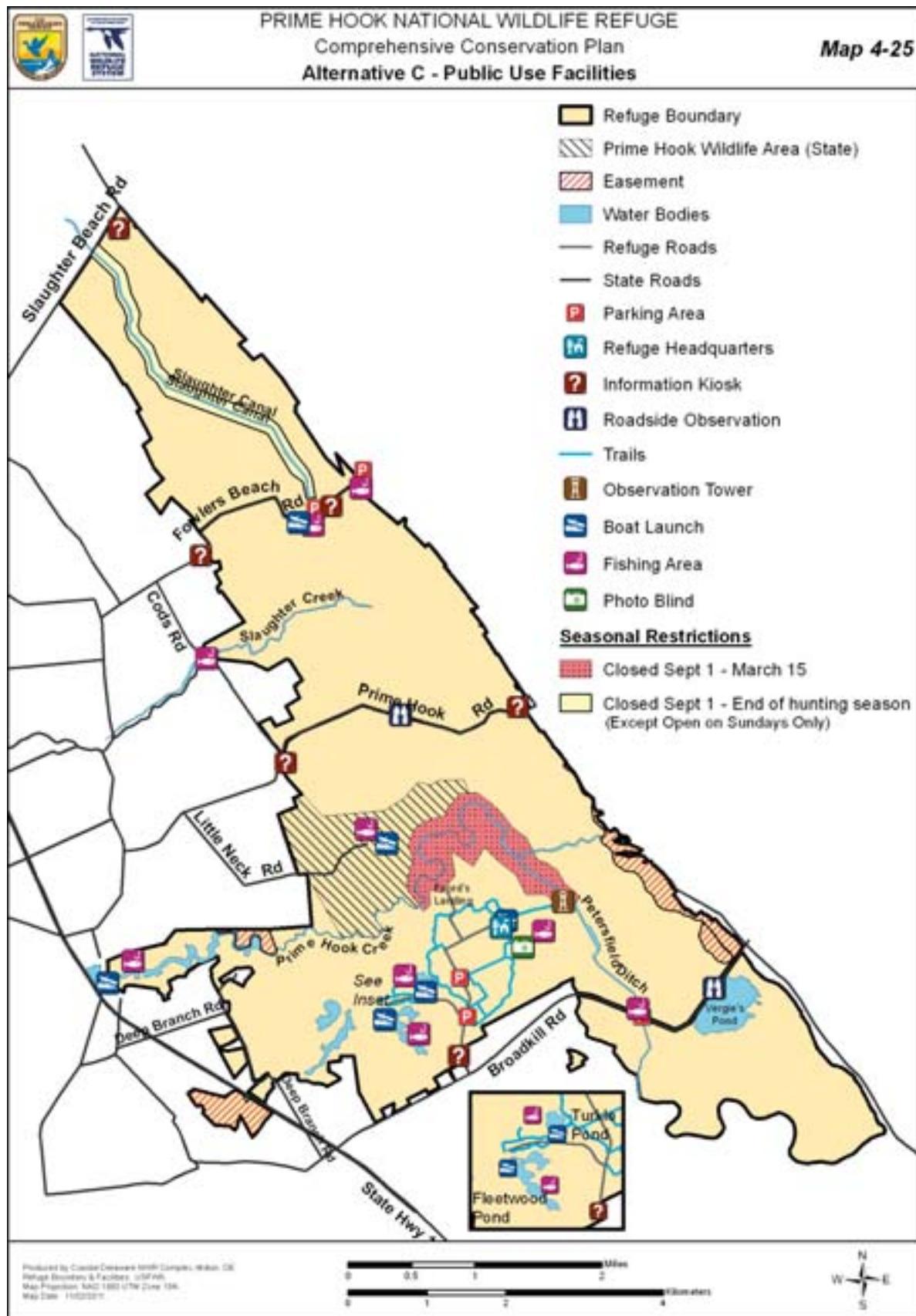
Map 4-23. General habitat cover in Unit III under alternative C



Map 4-24. General habitat cover in Unit IV under alternative C



Map 4-25. Public use opportunities under alternative C



range of less than 6 feet (Komar 1998). Leatherman (1988) further distinguishes between two types of classifications based on sediment supply conditions. Transgressive indicates sand deficiency and propensity for shoreline migration landward. Regressive denotes accretion, often evidenced by multiple dune ridges or crests. The refuge's barrier is best described as a microtidal transgressive barrier system, which is the less stable and more vulnerable to storm-induced changes than a wider beach. This type of barrier is long and narrow with a few inlets and is characterized by low-lying topography and numerous washovers, indicating deficient sand supply and relatively rapid shoreline retreat (Leatherman 1988). Beach nourishment to stabilize dunes on such a barrier by using repetitive beach nourishment projects, can interfere with the long-term viability and is very costly. Beach nourishment does not halt the physical forces that are constantly acting on a microtidal transgressive system. To maintain its environmental health and to sustain the barrier and salt marsh system in the face of sea level rise, the barrier needs to migrate.

The shorelines of barrier island morphology are extremely changeable. The dynamism of the natural coastal processes characteristic of barrier island habitats means that beaches will constantly erode and accrete, dunes and shorelines will shift positions, overwash fans will be periodically active, and inlets will open, migrate and close (McLachlan and Brown 2006, Psuty 2004, Kraft et al 1975). Inlets are also the primary means by which sand is transported landward across a migrating barrier island system. They open and close in response to changing conditions and will migrate up and down along a barrier shoreline, provided they do not encounter an obstacle such as a road or jetty. Inlets that periodically form along microtidal coasts tend to close unless there is substantial outflow of water from inland sources (Leatherman 1988).

Beach nourishment has been used for dune stabilization mostly to protect recreational beaches and developed barrier island strands, but costs tens of millions of dollars annually. For example, shortly after Northeast winter storms of 1992-1993 opened a breach east of Fire Island National Seashore (Westhampton Dunes Section), just down drift of a group of groins installed decades before to stem erosion in the Hamptons. The inlet was reclosed using beach nourishment of 1.5 million cubic yards of sand at a cost of \$6.2 million by the USACE and has to be renourished about every four years. We do not have precise cost projections for the construction and long-term replenishment costs to maintain a barrier island across the eastern side of the refuge with sufficient integrity to withstand a major (100 year) storm, but it could easily be millions of dollars.

Heavy equipment, dredge pipes, and other activities necessary to construct this action, as well as the regular replenishment actions, will affect beach and dune habitats and the species nesting, feeding, or resting there. While some activities can be timed outside of the active shorebird nesting season, there will still be repetitive disturbance to these habitats and to vegetation, invertebrate communities , and other species which do not migrate.

The use of sand nourishment to repair the breaches south of Fowler Beach Road has been suggested by many members of the public. It has been suggested that the refuge should re-establish the barrier to reduce erosion or flood risk to nearby developed properties. The Service empathizes with the plight of landowners on the very low-lying barrier island and continues to explore alternatives for access to the barrier under high water conditions, but it cannot be responsible for private decisions to construct in flood prone and vulnerable locations. This alternative is not under consideration as a means of flood damage protection for adjacent development.

Others have suggested that reconstruction of the barrier island will reduce salt water intrusion into local farmland. As explained above, both land subsidence and sea level rise are occurring in this area and subsidence occurs through compaction of the soil, ground water drainage and ground water withdrawal. Service-owned former uplands have already been affected by salt water intrusion, and the Service does not withdraw ground water and has halted agricultural activities on much of the refuge. Refuge lands, as well as private farmlands surrounding the refuge, share the common future of increased saturation by salt water. As the refuge lands become increasingly saturated, they will transition to more moist and salt-tolerant vegetation; private lands are likely to be less able to support traditional agricultural crops. Salt marsh haying or, if sufficient fresh water supplies are available, perhaps freshwater impoundments or cranberries may be feasible on these more saturated uplands.

Alternative C is being evaluated in recognition that the refuge once supported thousands of acres of fresh water marsh and moist soil habitat, which was a very valuable for certain migratory birds. Under all of the Alternatives, the refuge will continue to have beach and marsh habitats which are important to other species of migratory birds, but it is likely to have reduced numbers of mallards and/or pintails under Alternatives A or B.

Given the environmental impacts arising from beach nourishment, there would need to be additional NEPA and other environmental reviews, based upon more specific engineering designs, which have not been developed at present. In addition to other significant environmental impacts, the two strongest factors tempering the likelihood of implementation of this alternative are the high costs, which are clearly outside of any budget likely to be appropriated to the Service, and the fundamental problem of project integrity. Recognizing how quickly freshwater vegetation dies if rapid salt water intrusion occurs, if a dune and beach system is designed to be sufficiently robust to withstand any likely coastal storm, it will have to be quite large, and it may deflect wave forces to adjacent areas. If it is designed at a lower level of structural integrity, then given the increasing likelihood of sea level rise, increased storminess or increased intensity of storms with climate change, its ability to meet the purpose of the project would be compromised. Of the three alternatives, Alternative C is therefore least likely to be able to meet the project's purpose of sustainability and adaptability in the face of climate change and sea level rise or economically realistic.

**Objective 1.1 Overwash,
Sandy Beach and Dune
Grassland Habitats**

Allow natural processes to affect the evolution and functioning of coastal landforms and habitats (including sandy beach, overwash tidal flats, dune and grasslands, and mudflats) along approximately 1.5 miles of shoreline only in Unit I, as they naturally evolve in order to conserve spawning horseshoe crabs, American oystercatcher, and other State and federally listed beach nesting bird species, and provide feeding and staging habitats for sanderlings, whimbrel, and other migratory shorebirds

Rationale

BCR 30 has the densest human population of any region in the country. The highest priority bird species listed for immediate conservation action are those that have sustained the greatest loss of beach, sand, overwash, and dune grassland habitats in this region and State. Development of roads and homes along and in these habitats has been and continues to be the primary factor for imperiling listed bird species along the Delaware Bayshore and BCR 30 Atlantic coastal areas.

Barrier beach island habitats are storm-maintained ecosystems, and are the preferred habitats of many migrating and breeding shorebird species identified as of greatest conservation need by both State and regional conservation plans. The protection and conservation of these birds entails allowing the dynamic nature of these habitats to perpetuate, as they are critical for many rare species like American oystercatchers, least and common terns, piping plovers, black skimmers, beach dune tiger beetles, and seabeach amaranth that are all dependent on habitats maintained by coastal storms. Under this alternative, naturally functioning barrier beach habitats are limited to the shoreline of Unit I, whereas such habitats within Unit II are subject to manipulation in order to support the management of freshwater impoundments.

Strategies

- Permit the natural processes of inlet formation, sand migration, and overwash development only in Unit I
- Monitor resources of concern and conduct baseline inventories and surveys as funding and staffing allows
- Conduct seasonal beach closures if and when Federal or State endangered shorebird species attempt to nest on refuge overwash habitat

Objective 1.2 Maritime Shrub and Forested Habitats

Continue passive management of approximately 320 acres of successional maritime salt shrub and successional maritime forest and maritime red cedar woodland habitats.

Rationale

Same as Alternative A

Strategies

- Same as Alternative A

Objective 1.3 North Atlantic Low and High Salt Marsh Habitats

Conserve approximately 2,200 acres of existing refuge salt marsh resources, located in Units I and IV, for the benefit of salt marsh-dependent species, to include a mix of high and low *Spartina* salt marsh, pool panne, and irregularly flooded eastern tidal salt shrub habitats.

Rationale

Same as under alternative B, objective 1.3

Strategies

- Restore the natural hydrology to existing tidal marshes in Unit I and Unit IV whenever feasible and allow natural processes to occur that increase tidal flows to salt marsh habitats.
- Develop an adaptive management framework for *Phragmites* control so treatments are monitored and evaluated for effectiveness. The refuge will be using an integrated approach to *Phragmites* control, which will consider restoration of natural processes, herbicides, prescribed burning, biocontrol, and other tools as they are developed.
- Control additional invasive species if and when they are encountered in the salt marsh
- Use obligate salt marsh passerines, such as the seaside sparrow, as indicators of biological integrity, diversity, and environmental health (BIDEH) for salt marsh habitats.

- Within 1 to 2 years of CCP approval, develop monitoring protocols and an annual biological monitoring and inventory program to document annual salt marsh condition, prescriptive management actions taken, and response to management actions.
- Consider continuing or resuming snow goose hunting to alleviate some snow goose use in salt marsh areas, to reduce salt marsh.

Mosquito Control Strategies

- Same as alternative B

GOAL 2.

Forested Habitats

Manage the biological diversity, integrity, and environmental health of refuge upland and wetland forested cover-types to sustain high quality habitats for migratory birds and increase quality habitat for the endangered Delmarva fox squirrel, breeding and wintering landbirds, reptiles, amphibians, and other resident wildlife.

Objective 2.1 Mixed Hardwood Forest Communities

Continue enhancing and protecting more than 750 acres of existing oak forest and mixed hardwood cover-types using prescribed fire and mechanical treatments of understory in appropriate stands to improve habitat conditions for and benefit migratory birds.

Rationale

Extensive upland forest loss and fragmentation provided the impetus for the State to designate upland forested blocks greater than 250 acres in size as key wildlife habitats. Exotic species are another great conservation concern. Of the 115 tree species found in Delaware, only 60 are native species. The loss of native upland forested habitats has taken a large toll on migratory song birds and forest interior dwelling breeding birds that all require large contiguous blocks of forested habitats. These include black-and-white warbler, whip-poor-will, cerulean warbler, hooded warbler, and American redstart. Severe forest loss and habitat fragmentation were also responsible for the extirpation of the Delmarva fox squirrel from Delaware (ELI 1999).

The reintroduction of Delmarva fox squirrels to Sussex County in the mid-1980s included two locations, one of which was the refuge. The purpose of these reintroductions was to restore the squirrel to its historic range. To provide more optimal habitat for the fox squirrel before and after its introduction, increased forest management treatments (low intensity understory prescribed fire and hydro-axe removal of dense understory thickets in mixed hardwood stands) were recommended by recovery team members as good management practices to benefit the squirrel. These conservations actions were performed several times in various timber stands from 1987 to 1995.

The first bald eagle nest was established on the refuge in 1991 on Second Hill. A single bird was produced and banded by State biologists and fledged that summer. The same pair has produced two young and built an additional nest on First Hill in Unit II. The nest on Second Hill was blown away in a storm but the pair produced eggs in 2007 and 2008 in a First Hill nest.

In 2006, a second bald eagle pair established a breeding territory on Horse Island in Unit III adjacent to Turkle Pond and has produced a pair of birds each breeding season up to and including 2008. Refuge breeding territories have proven successful due to plentiful food supplies, minimal human disturbance, and adequate habitat features. New juveniles recruited each year have increased

the numbers of summer roosts on the refuge. Roost sites typically offer isolation and good food resources nearby. Bald eagles remain designated as a State endangered species, despite Federal delisting in 2008.

Strategies

- Use prescribed fire where appropriate to maintain or restore habitat for Delmarva fox squirrel.
- Monitor migratory bird use in forested habitats.
- Perform early detection/rapid response of invasive species and treat accordingly using integrated pest management strategies.
- Improve forested habitat conditions to benefit fox squirrels.
- Follow the bald eagle management guidelines.
- Support Service and State efforts to monitor local populations.

Objective 2.2 Wetland Forested Habitats

Continue passive management of approximately 1,200 acres of existing forested wetland cover-types on the refuge.

Rationale

The mid-Atlantic Coastal Plain forested wetlands include a highly diversified gradient of forest types. These habitats are dominated by woody species that are adapted to tolerate saturation of the root zone for varying duration and frequency during the growing season. Nationally and on a State level, forested wetlands have experienced dramatic fragmentation and losses. Much of this loss has been due to clear cutting, filling, or draining of forested wetlands for conversion to agriculture or urban development (Cowardin et al. 1979, ELI 1999) leading to sharp declines in prothonotary warbler, Acadian flycatcher, yellow-throated warbler, and other migratory birds dependent on forested wetlands (PIF 44 and BCR 30 plans).

Strategies

- Monitor bird use.
- Map vegetation communities.
- Monitor and treat for invasive plant species.

GOAL 3.

Refuge Impounded Marsh Complex

Maintain, create, and enhance the quality of managed wetland habitats within and surrounding the refuge's impoundment complex for migrating shorebirds, breeding rails, wading birds, American black ducks, and migrating and wintering waterfowl. Support obligate amphibians and other native wetland-dependent species, provide fish passage and nursery habitats for anadromous fish species, and protect and conserve rare native flora and fauna dependent on refuge-managed hydrology.

Objective 3.1 Refuge Impoundment Management

Create a mosaic of habitat structural diversity across 4,200 acres of freshwater and brackish impounded areas for spring and fall migrating shorebirds, fall and spring migrating waterfowl, and wintering waterfowl.

Acreage and location of specific habitat types will vary from one impoundment to another from year to year, depending on weather, hydrology, wetland processes,

native vegetation and invasive plant management, snow goose herbivory patterns, and plant successional changes. Seasonal objectives will include the following habitat condition targets and acreage:

- **Spring migrating waterfowl (March 1 to May 1):** Provide 4,000 acres of shallowly flooded (2 to 14-inch depth surface water) mixed annual and perennial vegetation remnants from the previous growing season. Shallow water depths will also make invertebrate food resources available. An interspersion of 2,000 acres of vegetated areas with 2,000 acres of open water will mimic hemi-marsh conditions to serve as both feeding and resting waterfowl areas.
- **Spring shorebirds (mid-April to first week in June):** Create 1,200 acres of foraging habitat, consisting of low water depths (1 to 4 inches) to mudflat habitat with sparse to no vegetation (less than 15 percent coverage) during peak spring shorebird migration (entire month of May). Throughout the remainder of the year use moist-soil management techniques to encourage the annual production of invertebrates for shorebird foraging with densities of at least 4 grams per square meter.
- **Summer wading and secretive marsh birds (June to August):** Provide 800 acres of high quality feeding and breeding habitat for waders and secretive marsh birds. Habitat structure will consist of open, shallow water (5 to 15 inches) with patches of emergent wetland plants (rushes and cattails) that support fish, aquatic invertebrates, and amphibians interspersed with drier marsh areas required by rails during summer for brood foraging.
- **Fall shorebirds (July 1 to September 30):** Provide 500 acres of various impounded wetland habitats consisting of shallow water depths to mudflat (1 to 6 inches) with little to no vegetation (less than 15 percent coverage) to supplement barrier beach island and salt marsh habitats, as supplemental feeding and roosting areas for fall migrants.
- **Migrating, staging, and wintering waterfowl (November 15 to March 1):** Annually create 2,000 acres of hemi-marsh wetland conditions consisting of a 1:1 ratio of emergent plants to open water within three refuge impoundments.
- **Fall migrating waterfowl (September 1 to December 30):** Make available 4,200 acres of feeding and resting habitats by conducting slow re-flooding regimes within moist-soil areas to provide natural foods dominated by wild millet, panic grasses, sprangletop, nutsedge, and smartweeds with various water depths ranging from 4 to 12 inches. Patch sizes within the impoundments will range from 50 to 500 acres with at least 50 percent of surface areas exposed to generate moist-soil plants in the summer and flooded to optimum forage depths for dabbling ducks in the fall.
- **Wintering waterfowl (December to end of February):** Provide 4,200 acres of feeding and resting habitats within the refuge's impoundment complex. These areas will consist of predominately annual emergent moist-soil vegetation with patches of perennials and open water areas, created from gradual asynchronous drawdown and reflood schedules among all three impoundments. Final full-pool water levels will generally not exceed 18 inches of foraging water depths.

Rationale

The refuge will manage three impoundments (ranging from freshwater in Units II and III, to brackish in Unit IV) for the primary purpose of providing high-quality feeding and resting habitats for migrating waterfowl, shorebirds, and other wetland-dependent species. Prime Hook's impounded marsh complex can

provide important wetland habitats and natural food resources for waterfowl in the State. During the last decade of impoundment management the refuge hosted at least 50 percent of the State's migrating and wintering waterfowl aerially surveyed, more than 65 percent of the State's wintering pintails, 50 percent green-winged teal, and 40 percent of wintering black ducks, with peaks of more than 75,000 dabbling ducks seasonally using these marshes. These same habitats are also very important for breeding and migrating shorebirds, secretive marshbirds, waterbirds, and other wetland-dependent wildlife (see chapter 3, Affected Environment, for more detailed information on waterfowl and shorebird use of refuge wetland habitats under impoundment management as proposed in alternative C).

Hemi-marsh and native vegetation management provide broad cover and optimal food resources, resulting in the best habitat management outcomes for migrating, staging and wintering waterfowl. Impounded marshes managed to create shallow water levels, native emergent patches, and a hemi-marsh condition provide habitat conditions for waterfowl use throughout the fall migrating and wintering periods to sustain the annual life cycle requirements of waterfowl (Bookhout et al. 1989). The emergent plant component is a 50:50 mix of emergent stands and open water and consists of a wide diversity of native vegetation. Stands will be of two types: perennial stands composed of cattail, hibiscus, wild rice, marshmallow, water dock, etc. and stands of annual moist-soil plants, such as wild millet, panic grasses, sedges, sprangletop, smartweeds, spikerushes, and beggarsticks. Managing native vegetation in the form of moist-soil crops has more benefits for waterfowl than managing agricultural crops.

The refuge's freshwater impounded marshes located within Unit III have supported several areas of exemplary native plant communities found nowhere else in the state (McAvoy et al. 2007). The most significant community found on the refuge is the NVCS association twig rush peat mat. Six different locations occurred along the red maple-seaside alder swamp matrix, within the Unit III impoundment, connected to Prime Hook Creek. These sites may represent an intermediate stage in the succession from open water to peatland and forested wetland, but they are floristically diverse and support many state rare plants (see table 3-9).

Although managed impoundments may deviate from the historic natural conditions in a wetland area, they constitute a management option that is consistent with the BIDEH policy. The BIDEH policy states that "individual refuges may at times compromise elements of biological integrity, diversity, and environmental health at the refuge scale in support of those components at larger landscape scales." Effectively managed impoundments can contribute to diversity on the local scale, and can contribute to landscape-scale conservation of species, which concentrate in the impoundments during migration and winter. Water level manipulation in impoundments is intended to mimic natural hydrological regimes in a controlled and enhanced manner to maximize plant production.

As described in chapter 3, the freshwater impoundments at the refuge were remarkably successful at providing quality foraging and roosting habitat for migrating and wintering waterfowl. However, as outlined in that same chapter, significant obstacles must be overcome in order for these impoundments to be re-established as freshwater wetlands and managed into the future as they were in recent decades. Significant environmental, physical, structural, monetary, and regulatory hurdles would need to be addressed to maintain freshwater impoundments on the refuge. Accomplishing of the infrastructure improvement strategies listed below would be essential to create the prescribed freshwater

impoundment management regime with any level of effectiveness, and even then may not be achievable for the full duration of the 15-year planning horizon.

Strategies

- As funds can be secured, replace or upgrade water control structures to compensate for the subsidence (or initial construction error) that has reduced water management effectiveness.
- Work with DelDOT to correct the issue of low elevation roads, which increasingly hampers the ability to manage water levels effectively.
- Utilize an off-site sand supply to reestablish the dunes along Unit II to protect the freshwater integrity of the Unit II and Unit III impoundments.
- To the extent feasible with existing infrastructure (unless or until replaced), use a combination of slow and rapid drawdowns to increase the production of invertebrates and wetland plant foods for shorebirds and waterfowl.
- Practice asynchronous drawdown and reflooding schedules between impoundments to maximize seed yields of annual moist-soil plants in areas where appropriate conditions persist, and annually develop structural diversity and mudflat habitats for shorebirds and waterfowl.
- Water levels are raised slowly in the fall (not to exceed 2.8 msl) to provide a continuous supply of food resources throughout the migration period.
- Control invasive and noxious plant and animal species.

Objective 3.2 Manage Water Quality for Trust Fishery Resources, Migratory Birds, and Resident Wildlife

Manage impounded wetlands for interjurisdictional fish species and improve water quality to perpetuate fish and migratory bird resources.

Rationale

Because of their wide geographic distribution and migratory patterns, many fish populations are dependent on freshwater, coastal, and marine areas that are managed by multiple states. The Service's Northeast Region Fisheries Program has identified the need to work with partners to restore and manage interjurisdictional fish species along the Atlantic Ocean. The Atlantic State Marine Fisheries Commission manages 22 species of Atlantic coastal fish; several of these species depend on refuge habitats, especially populations of freshwater, coastal, and anadromous fish.

For example, shad and river herring are anadromous fish that spend the majority of their adult lives at sea, only returning to freshwater areas in the spring to spawn. Historically, shad and river herring supported the largest fishery populations in the Atlantic Coast, but due to habitat degradation and impediments of passage to freshwater resources, shad and river herring populations are severely depleted. Other species of management concern include American eel, striped bass, and horseshoe crabs. Maintaining fish passage for spawning and nursery habitats and improving water quality are key management actions to address declines of anadromous fish populations and ensure healthy ecosystems to perpetuate interjurisdictional fish species. Through these actions, the refuge can contribute potential habitat to meet the needs of interjurisdictional fish species that occur throughout the Delaware Bay.

Strategies

- Conduct fisheries inventories and water quality assessments to evaluate resource conservation needs and receive direction from fisheries biologists

regarding management recommendations to protect and enhance refuge fish and other aquatic species.

- Install and maintain fish weir passages in Unit II and III water control structures to allow unimpeded passage of river herring and other anadromous trust species.
- Improve or restore water quality by restoring water circulation within refuge impoundments by ditch cleaning and maintaining approximately 7.5 miles of ditch-network in Unit III and 3,300 linear feet in Unit IV.

GOAL 4.

Early Successional Upland Habitats

Maintain, enhance and restore the native vegetation, biological diversity, and ecological integrity of early successional upland habitats to create a mosaic of native grassland or herbaceous scrub/shrub habitats mixed with transitional forested areas to conserve migratory birds, breeding landbirds, and endangered species, and to maximize benefits for other priority resources of concern.

Objective 4.1 Transitional Habitats: Grasslands, Shrublands, and Young Trees

Conduct a cooperative farming program on a maximum of 600 acres to provide green browse for ducks (primarily mallard, black duck, pintail, and wood duck) and Canada geese during the fall and winter.

Rationale

Farming was historically accomplished on the refuge under an annual cooperative farming agreement under which cooperators harvested 100 percent corn or soybeans. Instead of cash payments for land rental, cooperators provided the refuge in-kind services that included planting of cover crops (barley, wheat, ryegrass, buckwheat or clover) to benefit wildlife.

As stated in the 1970 Cropland Management Plan, the primary objective of the refuge's cooperative farming program was to provide supplemental foods for waterfowl in upland habitats and for Canada geese during the fall, winter, and spring. Upland farmed habitats were also to supply forage areas to benefit the endangered greater snow goose population. A secondary objective of the farming program was to promote duck production with croplands in grass and clover stages of rotation designed to provide nesting habitats for duck species. Farming, as a management activity, is consistent with the Refuge System's BIDEH policy only if it is determined to be necessary to meet refuge purposes. Furthermore, the BIDEH policy dictates that refuges may not use genetically modified organisms (GMO), such as crop seeds, in habitat management without the approval of the regional chief of refuges.

From the early 1970s to 1987 cropland acreage on the refuge increased annually. Peak farmed acreage reached about 1,000 acres by the late 1980s with a gradual reduction to about 600 acres by 2002. The reduction is attributed to access, saltwater intrusion, and inclusion of several fields in a grassland bird research project.

In 2006, a lawsuit against the refuge charged that farming was being conducted on the refuge without having been properly evaluated through NEPA and a compatibility determination. In 2009, the refuge was ordered to cease farming until the practice could be properly and transparently evaluated during the CCP process. As a historic management practice, farming is evaluated within this CCP as part of this alternative.

Strategies

- Use cooperative farming programs, including the utilization, as approved, of GMO crops (glyphosate-tolerant corn and soybeans), to provide cover crops for migrating and wintering waterfowl from November 1 to March 1. This also includes non-harvested cover crops, such as winter wheat and clover.

Objective 4.2 Grassland Bird Habitat Management

Continue to restore old field areas that have been abandoned from cropland program using passive management, i.e., allow areas to revert to natural succession, controlling noxious weeds as needed or actively reforesting old field areas with approved planned restoration projects to benefit Delmarva fox squirrel and migratory landbird species.

Rationale

Some fields will be opportunistically removed from farming, even as the farming program is implemented. The restoration of some old fields to natural vegetation via natural succession, maintaining native grassland areas, or conducting assisted reforestation in other areas to increase potential habitat for Delmarva fox squirrel will improve long-term endangered species management on the refuge and benefit other priority breeding landbird and migratory bird species that are declining in the state and region. These have been identified as priority resources of concern for the refuge and listed as target focal species in the beginning of this chapter.

Strategies

- As cropland areas are abandoned by cooperators or used for research purposes, opportunistically convert them to natural vegetation to benefit endangered species and other migratory bird species of concern that are not waterfowl species.

GOAL 5.

Visitor Services

Provide visitors with a place to safely take part in the six priority wildlife-dependent recreational uses established by the Refuge Improvement Act, as well as such other public uses as may be allowed without interfering with refuge purposes and objectives for wildlife.

Objective 5.1 Hunting

Provide a high-quality hunting program that is administratively efficient and is used to maintain healthy habitats through the management of wildlife populations, where appropriate.

Rationale

Hunting on the refuge would be expanded from alternative A (current management) but not to the degree proposed under alternative B. With staffing levels similar to alternative A, staff time made available by the more efficient hunting program will be shifted toward focusing on public outreach and education. Hunting days and areas will be increased from alternative A, but turkey hunting will be closed. Upland game and webless migratory bird hunting would be the same as under alternative A. The cost of the hunting program would be \$1,300 less than the annual hunting program proposed under alternative B.

Strategies

The strategies would be the same as alternative B except for the following modifications or exceptions,

- Do not open the refuge to turkey hunting.

- Do not open boat ramps at the old maintenance area at Foords Landing for access to Prime Hook Creek.
- Seasonal closures apply to non-consumptive users during the hunting season, which is typically a slower period of use due to weather conditions, and are highlighted below:
 - Eastern Prime Hook Creek (from old shop ramp to headquarters ramp) (Unit III): Closed every day from September 1 through March 15.
 - Headquarters area (includes Turkle and Fleetwood Ponds) (Unit III): Closed only for one day for a deer hunt.
 - Slaughter Canal: Closed every day except Sunday from September 1 through the end of the deer and waterfowl hunting seasons.

Objective 5.1a White-Tailed Deer Hunting

Provide high-quality hunting opportunities for white-tailed deer.

Rationale

Deer hunting on the refuge would be expanded from alternative A (current management) but not to the degree as proposed in alternative B. More emphasis will be placed on public outreach and education. When compared to alternative B, deer hunting would consist of a reduction in hunting days from every day during the State hunting season to three days per week (Tuesday, Thursday, Friday), the closure of Prime Hook Creek to hunting, and a reduction from a two-day to a one-day hunt in the Headquarters Area. Acreage lost to deer hunting from alternative B would be 480 acres along Prime Hook Creek.

Map 4-26 depicts deer hunting opportunities and infrastructure under alternative C.

Strategies

The strategies would be the same as objective 5.1 and alternative B except for the following modifications or exceptions:

- Expand deer hunting opportunities to include 4,909 acres (an increase of 1,033 acres from current management).
 - Hunting would be open only on Tuesday, Thursday, and Friday throughout the State hunting season in the regular deer hunt area.
 - Prime Hook Creek will not be open to deer hunting.
 - The number of deer hunts in the headquarters area (lottery deer hunt area) is reduced from two to one hunt.

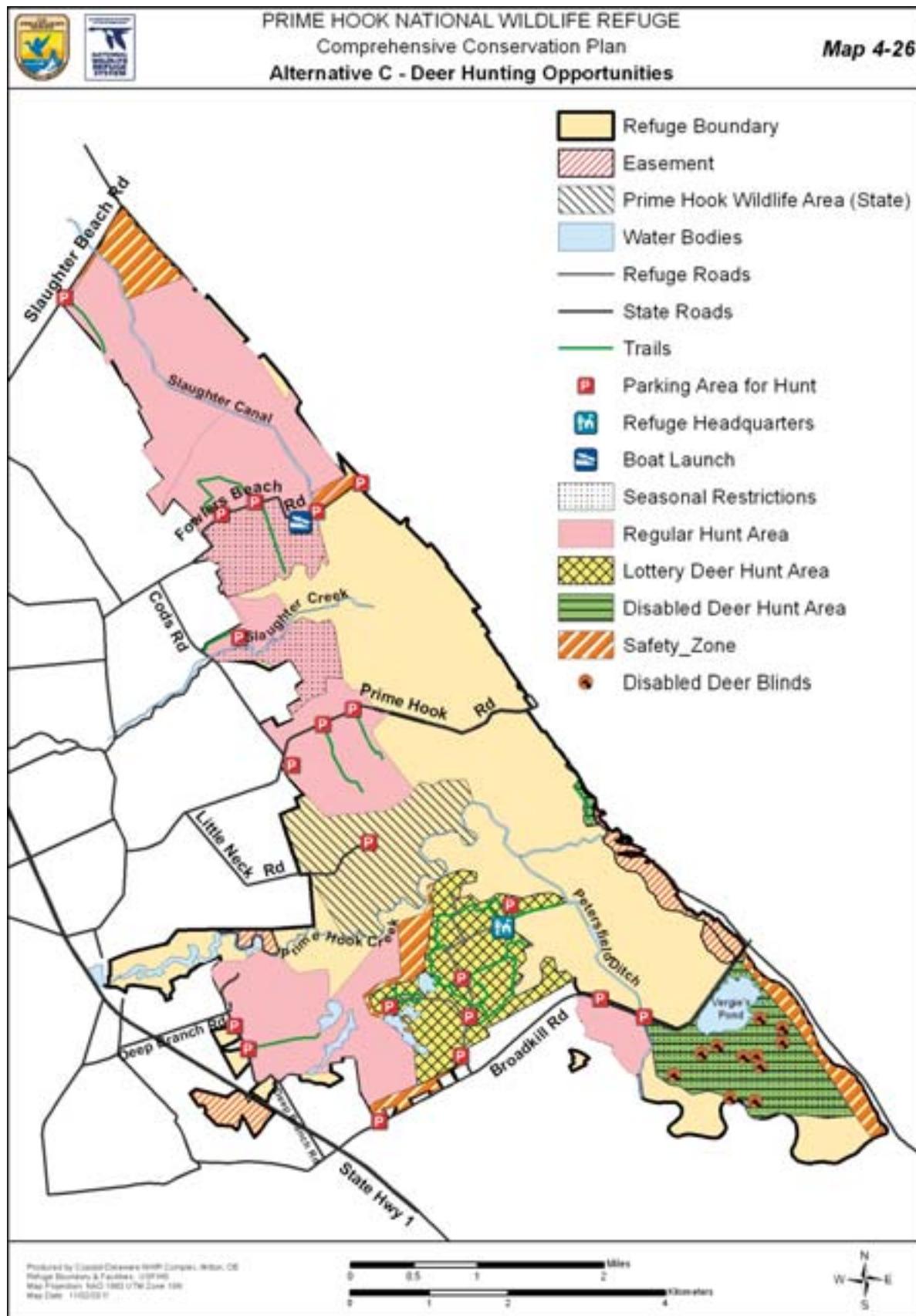
Objective 5.1b Waterfowl Hunting

Provide high-quality hunting opportunities for waterfowl.

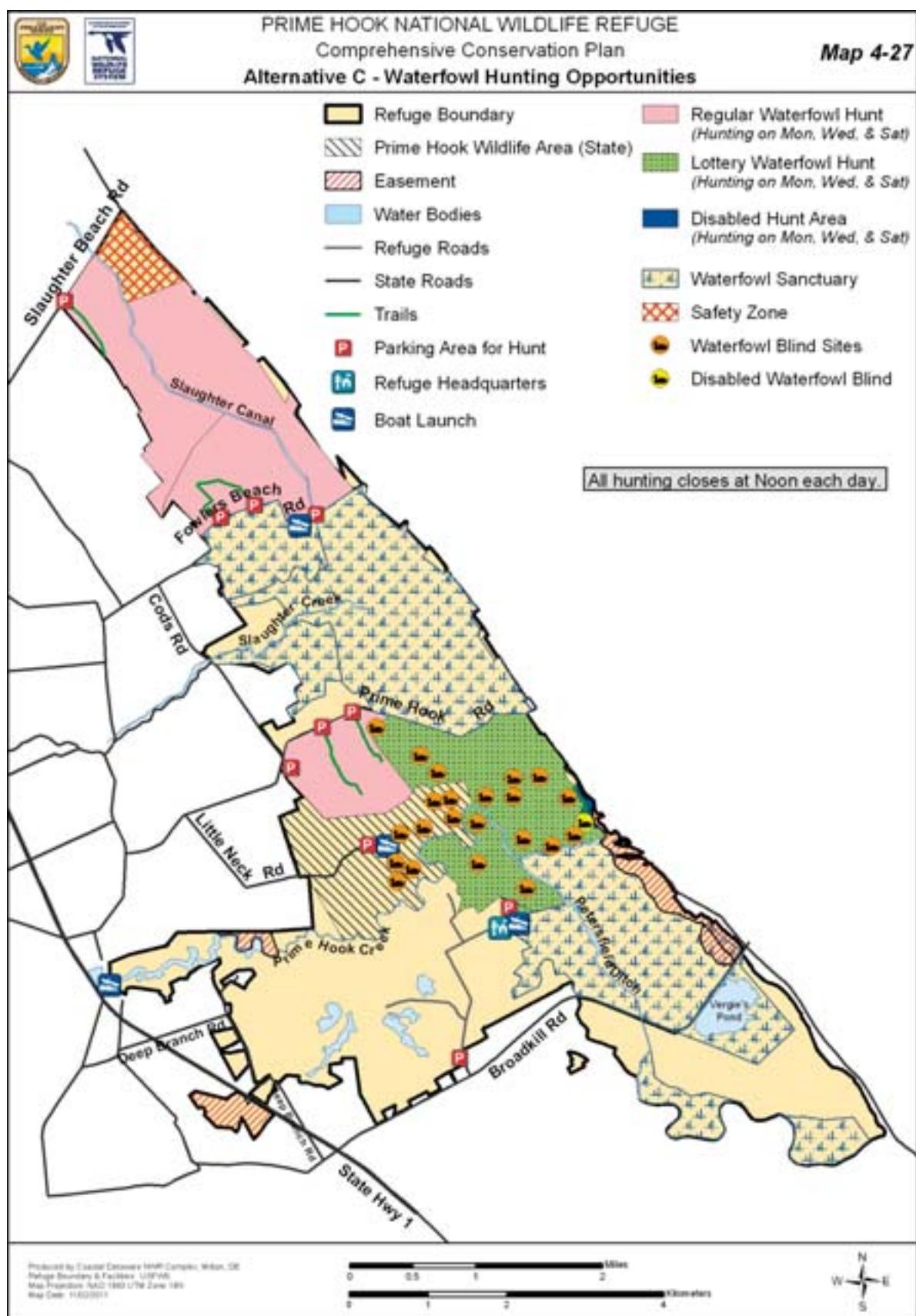
Rationale

Waterfowl hunting on the refuge would be expanded from alternative A (current management) but not to the degree proposed in alternative B. More emphasis will be placed on public outreach and education. When compared to alternative B, waterfowl hunting would consist of a reduction in hunting days from every day in the free-roam areas (regular waterfowl hunting area) during the State hunting season to three days per week (Monday, Wednesday, Saturday), the closure to hunting of Prime Hook Creek and Unit IV along the Broadkill River, and the closure of hunting for early teal, resident Canada geese, and the snow goose conservation order. This alternative has a reduction of 582 acres from alternative B. Map 4-27 depicts waterfowl hunting opportunities and infrastructure under alternative C.

Map 4-26. Deer hunting opportunities under alternative C



Map 4-27. Waterfowl hunting opportunities under alternative C



Strategies

The strategies would be the same as objective 5.1 and alternative B except for the following modifications or exceptions,

- Expand hunting opportunities to include an additional 1,150 acres from current management.
- Hunting would be only open on Monday, Wednesday, and Saturday throughout the State hunting season in all hunting areas (both lottery and regular areas).
- Close hunting for early teal, resident Canada goose, and the snow goose conservation order.
- Prime Hook Creek and Unit IV along the Broadkill River will not be open to waterfowl hunting.

Objective 5.1c Upland Game and Webless Migratory Bird Hunting

Provide high-quality hunting opportunities for upland game (rabbit, quail, pheasant, and red fox) and webless migratory birds (mourning dove, snipe, and woodcock).

Rationale

Same as under alternative B, objective 5.1c.

Strategies

Same as under alternative B, objective 5.1c.

Objective 5.2 Wildlife Observation and Photography

Provide high-quality wildlife observation and photography opportunities.

Rationale

Opportunities for wildlife observation and photography on the refuge would be the same as alternative A but would also include the closure of the trail and observation platform overlooking Vergie's Pond and the boat ramp at the old maintenance facility at Foord's Landing on Prime Hook Creek. More emphasis will be placed on public outreach and education. Map 4-25 depicts wildlife observation and photography opportunities and infrastructure under alternative C.

Strategies

The strategies would be the same as alternative A except for the following,

- Eastern Prime Hook Creek (from old shop ramp to headquarters ramp) (Unit III) will be closed every day from September 1 through March 15.
- Slaughter Canal will be closed except for Sundays from September 1 through the deer and waterfowl hunting seasons.
- Abandon the project to open the boat ramp at the old maintenance facility on Foord's Landing to access Prime Hook Creek.
- Abandon and close the trail and observation platform overlooking Vergie's Pond on the south side of Broadkill Beach Road

- Interpretive auto tour route
 - * Create an interpretive brochure outlining the wildlife viewing areas, trails, pull-offs, etc., that can be accessed from public roads and highways.
 - Investigate the potential to use advanced technology (radio, compact disc, cell phone, or downloadable programming) to provide visitors with interpretive material about the refuge related to wildlife observation and photography.
 - * Area will be open year-round.
- Within 5 years of the CCP approval, develop a visitor services plan for the refuge.

Objective 5.3 Fresh and Saltwater Fishing and Crabbing

Provide high-quality fishing and crabbing opportunities.

Rationale

Opportunities for recreational fishing and crabbing on the refuge would be the same as alternative A and also include adopting catch-and-release regulations for Turkle Pond, Fleetwood Pond, and Prime Hook Creek, requiring the use of barbless hooks in catch-and-release fishing areas, and not allowing recreational gill netting, commercial fishing, food fishing with equipment other than hook and line, and crabbing using pots or trot lines. More emphasis will be placed on public outreach and education. Map 4-25 depicts recreational fishing and crabbing opportunities and infrastructure under alternative C.

Strategies

The strategies would be the same as alternative A except for the following:

- The eastern portion of Prime Hook Creek (Unit III) is closed from the old maintenance facility at Foord's Landing to the headquarters boat ramp from September 1 through March 15.
- Adopt catch and release regulations, including the mandatory use of barbless hooks, for Turkle Pond, Fleetwood Pond, and Prime Hook Creek.
- Do not allow recreational gill netting, commercial fishing, food fishing with equipment other than hook and line, crabbing using pots or trot lines (collapsible traps are permitted if attended to at all times).
- General regulations for recreational fishing and crabbing
 - * Catch-and-release regulations apply, including mandatory use of barbless hooks for Turkle Pond, Fleetwood Pond, and Prime Hook Creek.
 - * Crabbing will be conducted using only hand lines and collapsible traps. Collapsible traps must be fished from the shore only and the owner must be present. All other types of crabbing equipment are prohibited.

Objective 5.4 Environmental Education and Interpretation	Provide high-quality environmental education and interpretation opportunities.
-----------------------------------------------------------------	--------------------------------------------------------------------------------

Rationale

Opportunities for environmental education and interpretation on the refuge would be greatly enhanced from alternative A and alternative B with more staff time being devoted to these programs. In addition to alternative B, alternative C would develop more programs directed toward youth and career development, provide more interpretive programs and displays, and implement a volunteer master naturalist program. Map 4-25 depicts facilities and infrastructure used to support environmental education and interpretation opportunities under alternative C.

Strategies:

The strategies would be the same as alternative B and also include the following:

- Develop education programs targeting teens and young adults focusing on practical applications such as how to make environmentally conscious decisions.
- Develop a program designed for those interested in education as a career and give participants an opportunity to be involved in planning and implementing youth environmental education programs.
- Implement a volunteer master naturalist program.
- Develop three to five presentations that focus on different themes associated with refuge goals and objectives, such as habitat, wildlife, and visitor services.
- Develop an educational presentation that plays continually in the visitor contact station informing the public on topics such as the history of the refuge, types of habitat present, upcoming events and activities, and volunteer opportunities.
- Develop a new display(s) in the visitor contact station promoting backyard habitat and the importance of native species.

Objective 5.5 Other Recreational Use	Provide opportunities for the public to use and enjoy the refuge for traditional and appropriate non-wildlife-dependent recreation that is compatible with the purposes for which the refuge was established and the mission of the Refuge System.
---------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Rationale

Same as under alternative B, objective 5.5.

Strategies

Same as under alternative B, objective 5.5.

GOAL 6.

Outreach and Community Partnerships

Collaborate with the local community and partners to complement habitat and visitor service programs on the refuge and the surrounding landscape.

Objective 6.1 Community Outreach

Continue to provide community outreach by conducting programs or events each year, and initiate news articles to increase community understanding and appreciation of the refuge's significance to natural resource conservation and its contribution to the Refuge System, and to garner additional support for refuge programs.

Rationale

Opportunities for community outreach would be greatly enhanced from alternative A and alternative B with more staff time being devoted to this effort.

Strategies

The strategies would be the same as alternative B and also include the following:

- Develop a comprehensive outreach strategy
- Allow visitors to register for upcoming activities and events online
- Utilize new technology such as Twitter and Facebook
- Conduct an evaluation of the effectiveness of current outreach techniques and identify at least two specific audiences for outreach goals that have been unexplored

Objective 6.2 Private Landowner Assistance

Within 5 years of CCP approval, establish a greater role assisting landowners who seek to maintain and improve wildlife habitat on private lands within and adjacent to the refuge boundary.

Rationale

Same as under alternative A, objective 6.2 except for climate change and sea level information in alternative B.

Strategies

Same as under alternative A, objective 6.2 except for climate change and sea level information in alternative B.

Objective 6.3 Regional and Community Partnerships

Within the next 15 years, enhance our existing partnerships, and seek additional, collaborative relationships with Federal, State, and local government agencies and regional and community economic development and conservation organizations to fulfill mutual natural resource conservation mandates and help us meet our wildlife, habitat, and visitor services objectives.

Rationale

Same as under alternative B, objective 6.3.

Strategies

Same as under alternative B, objective 6.3.

Table 4-5. Summary comparison of management actions and issues by alternative

Actions Common to All the Alternatives describes many important actions, which are not discussed in the table below. Table 4.5 highlights those actions that distinguish the alternatives, how they relate to our goals, and how they address the significant issues identified in chapter 1. Please refer to the glossary to interpret any acronyms.

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Delaware Bay Shoreline Overwash	Allow the natural processes of inlet formation, sand migration, overwash development and vegetative succession to proceed unimpeded along the Unit I and Unit II Delaware Bay shoreline in all refuge units.	Same as Alternative A, with the exception that shoreline modifications may be conducted if deemed necessary to accomplish comprehensive salt marsh restoration.	Allow the natural processes of inlet formation, sand migration, overwash development and vegetative succession to proceed unimpeded only along the Unit I Delaware Bay shoreline.
Beach Nesting Birds	Make no efforts to maintain the dunes along the Unit II - Delaware Bayshore. We will allow physical forces to shape shoreline transgression, and permit overwash and inlet formations to prevail.	Recognizing that storm damage to the dune line and impoundment infrastructure has become cost prohibitive to repair, the impoundment will be proactively restored to tidal brackish/salt marsh.	Maintain and enhance, as needed the dunes along the Unit II-Delaware Bayshore, utilizing off-site sand material to protect freshwater impoundments.
	Monitor bird nesting activity on refuge beaches. Conduct seasonal beach closures if and when shorebird and colonial waterbird species attempt to nest on refuge overwash habitats.	Monitor bird nesting activity on refuge beaches. Conduct seasonal beach closures annually to actively encourage nesting by shorebird and colonial waterbird species on beach and overwash habitats.	Same as alternative B
	No action	In coordination with the Chesapeake Bay Field Office, develop a refuge-specific piping-plover contingency management plan should piping plovers establish nesting sites on refuge over-wash areas.	Same as alternative B
Management of <i>Spartina</i> High and Low Salt Marsh Habitats	Units I and IV are currently not actively managed.	We will manage, and/or restore the natural/historical hydrology of 2,200 acres of existing salt marsh cover types in Units I and IV to include a mix of North Atlantic high and low <i>Spartina</i> salt marsh, pool, panne, and irregularly flooded eastern tidal salt shrub habitats.	Same as alternative A; Unit I and Unit IV salt marshes will not be actively managed.
	Passive development of additional salt marsh within Unit II, and ultimately Unit III, will be permitted.	Active salt marsh restoration, e.g., improving wetland elevation and increasing historical flow and hydrology, will be pursued within impounded refuge wetlands to facilitate the healthy succession, resulting in additional brackish/salt marsh.	As managed freshwater impoundments, Unit II and Unit III contain little/no salt marsh.

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Impoundment Management	<p>Impounded refuge wetlands will be permitted to passively convert to salt marsh, mudflats, and/or open water.</p> <p>Make no efforts to maintain the dunes along the Unit II - Delaware Bay shore, instead allow nature to take its course so shorelines can migrate inland.</p> <p>Natural conversion to salt marsh, mud flats, and open water within refuge impounded wetlands will be permitted..</p> <p>Movement of brackish/saline water over the Fowler Rd and under the road through culverts is not managed in any manner by the refuge</p> <p>Allow natural filling of ditches with sediment and detritus, and ultimately succeed to historical emergent/salt marsh community to occur unimpeded.</p>	<p>Impounded refuge wetlands will be proactively restored to tidal brackish/salt marsh.</p> <p>Active restoration, e.g. improving wetland elevation and increasing historical flow and hydrology, will be pursued within refuge impounded wetlands to ameliorate damage and facilitate the healthy succession to a brackish/salt marsh.</p> <p>Active restoration, e.g., improving wetland elevation and increasing historical flow and hydrology, will be pursued within refuge impounded wetlands. This may include the eventual removal of Fowler Beach Rd., to permit full tidal flow and drainage between Unit I and Unit II.</p> <p>Same as alternative A. We will also work actively with State partners (DNREC, DelDOT) on flooding issues affecting state roads that cross the refuge. We will continue to work with them on any other road improvements that will alleviate flooding and ensure refuge resources are not significantly impacted.</p> <p>Clean refuge ditches using a cookie cutter/rotary ditcher on a 5-year rotational basis.</p>	<p>Establish an intensive moist soil management regime in Units II and III. This will require substantial repair and investment of wetland management infrastructure (e.g., dike roads, dunes, water control structures).</p> <p>Maintain and enhance, as needed the dunes along the Unit II-Delaware Bay shore in an effort to maintain the freshwater integrity of impoundment II and III.</p> <p>The refuge will shunt brackish/saline water from periodic overwash of State roads during storm events, and daily tidal flow through State-owned/managed culverts back to Unit I, via refuge-owned/managed water control structure, as much as is feasible.</p> <p>The refuge will shunt brackish/saline water from periodic overwash of State roads during storm events, and daily tidal flow through State-owned/managed culverts back to Unit I, via refuge-owned/managed water control structure, as much as is feasible.</p> <p>Periodically clean refuge ditches using a cookie cutter/rotary ditcher.</p>
Predator Management	Currently, no action		<p>Same as alternative A; No active predator management</p> <p>Develop a predator management plan designed to reduce predation on trust resources, particularly beach nesting birds. Predators will be managed through non-lethal and lethal means, including administrative trapping and shooting if losses endanger population viability. State licensed trappers or refuge staff would conduct predator management</p>

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Pest/Nuisance Animal Control	In cooperation with the USDA, continue reducing depredations by resident Canada geese on priority refuge habitats. Methods may include, but are not limited to, egg addling, lethal control, and roundups or molting birds for donation to charity soup kitchens and the needy. Currently, no action	Same as alternative A	Same as alternative A
		Mute swans are an invasive exotic species and are not protected by either the Service or the State of Delaware. Should mute swans become established on the refuge, birds will be removed through the most prudent and cost-effective means available, including shooting.	Same as alternative A; No active mute swan control.
		Should the location and/or number of nuisance and pest animals become an issue for proper management of critical habitats or infrastructure, the refuge will undertake prudent, cost-effective control measures. Individual animals or local populations will be managed through non-lethal and lethal means, including, but not limited to, exclosures, administrative trapping and shooting. State-licensed trappers or refuge staff would conduct pest or nuisance animal management.	Same as alternative A; No control of pest animals.
Snow Goose Habitat and Population Management	Currently, no action	Within the limits of established regulations, and policies, the refuge will support a unified and coordinated approach generated by the Service and States (and Canadian Wildlife Service) to address the issue of snow goose overpopulation in the flyway. These actions may include, but are not limited to, managed increase of hunter harvest (conservation order), and alteration of refuge upland and impoundment management regimes.	Same as alternative A; No active snow goose management.
Invasive Plant Control	Invasive plant management is an integral component of refuge habitat management. Various control methods are available including, but not limited to, prescribed fire, herbicides, tilling, mechanical removal, and biological control.	Same as alternative A	Same as alternative A
Mosquito Control	Currently, we allow use of Naled adulticides.	Eliminate use of adulticides except under a documented public health emergency or as directed by the Secretary.	Same as alternative B
	Currently, we allow use of laricides methoprene and Bti.	Only methoprene formations with short-term residuals (5 to 10 days) will be used for mosquito larval control when environmental conditions or life stage are likely to limit the efficacy of Bti products.	Same as alternative B
	Allow State of Delaware Mosquito Control Section to maintain and manage existing open marsh water management systems when the need is clearly documented.	Same as alternative A	Same as alternative A

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Cooperative Farming Program	Allow passive succession to shrublands or forest to occur in upland fields.	Manage upland fields to restore native habitats, especially forest, and benefit priority migratory landbirds.	Use cooperative farming programs to provide about 600 acres of supplemental food crops for migrating and wintering waterfowl.
Habitat Management Using Prescribed Fire	Maintain and/or enhance native vegetation communities using prescribed fire where appropriate.	Prescribed fire will be used more often and more proactively to manage early successional habitats, achieve desired forest conditions, and control invasive species.	Conduct prescribed burning as appropriate to maintain habitat for the listed Delmarva fox squirrel and to control priority invasive species such as Phragmites.
Management of Wildfires	Currently, prescribed fires are being used to reduce fuel hazards.	Same as alternative A	There would be no proactive management to reduce fuel hazards. Prescribed fires would not be used to reduce fuel hazards except in WUI communities. Same as A?
	Respond appropriately to any unplanned ignitions. No natural ignitions or human caused wildfires will be allowed to burn uncontrolled.	Same as alternative A	Same as alternative A
Early Successional Habitat Management	Open field areas will be allowed to naturally move through various stages of succession without conducting proactive habitat management actions, such as mowing, diskng, or using prescribed fire to maintain habitats in early successional serial stages.	Allow all agricultural land to revert to early successional grass, forb and shrub-scrub plant communities. Maintain early serial stages via mowing, diskng, and prescribed fire, in select fields.	Allow some marginal agricultural land to revert to early successional grass, forb and shrub-scrub plant communities. Maintain early serial stages via mowing, diskng, and prescribed fire in those select fields.
Delmarva Fox Squirrel Habitat/Forest Management	No proactive management. We allow extant forest and non-forested tracts to mature and develop via the process of natural vegetative succession.	Proactively manage extant forest and restore/reforest select non-forested tracts to increase DFS population viability and benefit forest interior dwelling birds by: <ol style="list-style-type: none"> 4) promoting stands dominated by early serial stages at the refuge periphery; 5) improving stands dominated of later serial stages in the refuge interior and along water courses; 6) promoting increased compositional and structural heterogeneity in managed stands, including large-diameter coarse woody debris and snags; 7) using management techniques that emulate natural ecological disturbances (e.g., single tree mortality for multi-aged stands, stand (cohort) replacement in even-aged stands); and 8) using commercial and non-commercial forestry mechanical treatments, when and where appropriate. 	Conduct limited management of extant forest and restoration/reforestation of select non-forested tracts to increase DFS population viability and benefit forest interior dwelling birds.
General Hunting Information	Continue permit-based hunt program.	Same as alternative A	Same as alternative A
	Continue to provide 136 permanent hunting structures for deer and waterfowl hunting.	Phase out permanent hunting structures over 5 years or when they become unsafe.	Same as alternative B
	Continue to maintain infrastructure, such as parking and access roads, to facilitate this opportunity.	Same as alternative A	Same as alternative A

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
General Hunting Information (cont.)	Continue to provide seasonal closures and time and space restrictions for hunters to eliminate user conflicts and minimize wildlife disturbance. Continue to provide four portable toilets.	Same as alternative A Eliminate four portable toilets.	Same as alternative A Same as alternative B
	No action	Expand hunting opportunities to include additional days and acres (see specific programs below).	Same as alternative B but reduce the number of hunting days and areas for deer and waterfowl hunting.
	No action	Provide a more administratively efficient hunting program (alternative B reduces cost of hunting program by 54 staff days and \$17,890).	Provide a more administratively efficient hunting program (alternative C reduces cost of hunting program by 59.75 staff days and \$19,205).
	Maintain daily standby permit drawings onsite for waterfowl and firearms deer hunts.	Eliminate daily standby permit drawings. Allow hunters throughout the season to claim vacant opportunities in lottery hunt areas through a contracted reservation service by phone or online. Blinds reserved but not claimed the morning of the hunt will remain vacant for the day.	Same as alternative B
	Require permit fees for all daily hunts.	Eliminate permit fees except for lottery hunt areas for deer, waterfowl, and turkey (no 50 percent discount; hunters under age 16 would still hunt free).	Same as alternative B
	Preseason drawings will continue for firearms deer hunting.	Conduct preseason drawings for high demand deer and waterfowl hunting areas through a contractor's reservation system by phone or online. Drawings for turkey hunting will be conducted by the State.	Same as alternative B
	Require hunters to hunt at fixed blind sites maintained by Service personnel for waterfowl and most firearms deer hunts.	Phase out permanent hunting structures except non-ambulatory blinds. Allow hunters to free roam in all hunt areas on a first-come, first-served basis, and select their own hunting sites, except lottery waterfowl hunt area and non-ambulatory hunt areas. Hunters provide blinds or portable tree stands as desired.	Same as alternative B
	Maintain existing hunting opportunities for disabled hunters.	Enhance hunting opportunities for non-ambulatory hunters.	Same as alternative B
	No boat ramp provided at old maintenance facility.	Within 5 years of the plan, open a boat ramp at the old maintenance facility for access to Prime Hook Creek.	Same as alternative A
	Hunters would be required to report harvest data to the refuge.	Hunters would not be required to report harvest data to the refuge.	Same as alternative B
Deer Hunting	Continue to provide deer hunting on 3,876 acres using archery, shotgun, and muzzleloader during State seasons.	Open 1,513 additional acres for deer hunting for a total of 5,389 acres using archery, shotgun, and muzzleloader during State seasons.	Open 1,033 additional acres for deer hunting, for a total of 4,909 acres using archery, shotgun, and muzzleloader during State seasons.
	Continue to facilitate a preseason lottery drawing and daily standby, lottery drawings to issue hunt permits.	Conduct preseason lottery drawings for a limited number of hunters for headquarters lottery hunt area and non-ambulatory lottery hunt area. Opportunities in the lottery hunt areas not claimed in the preseason drawing will be available throughout the season either online or by contracted phone-in reservation system.	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Deer Hunting (cont.)	<p>Continue to maintain 94 permanent elevated deer hunting stands and 11 wheelchair-accessible ground blinds for disabled hunters.</p> <p>Continue to require hunters to hunt from permanent deer hunting stands except for archery hunting or for party zone areas.</p> <p>Continue to close refuge headquarters area to all visitors during scheduled hunts.</p> <p>Continue to participate in the statewide youth deer hunt.</p> <p>Currently no regular/non-lottery deer hunting areas available.</p> <p>Prime Hook Creek will remain closed to deer hunting.</p> <p>Continue special areas open to deer hunters with permanent disabilities. A permanent disability is defined as a permanent physical, mental, or sensory impairment that substantially limits one or more major life activities, such as caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working.</p> <p>Continue to provide deer hunting for disabled hunters during the firearms and muzzleloader seasons on the Island Farm area during selected days, throughout the entire State deer hunting season.</p> <p>Prime Hook Beach remains closed to disabled deer hunting.</p> <p>Check-in and check-out is required for all hunts.</p> <p>Continue a headquarters lottery deer hunt.</p>	<p>Phase out the use of permanent elevated deer hunting stands. Hunters will be allowed to roam freely within the designated area.</p> <p>Use of permanent deer hunting stands will no longer be required. Hunter-owned portable stands are permitted.</p> <p>Same as alternative A</p> <p>Same as alternative A</p> <p>In regular/non-lottery deer hunting areas, hunting permitted everyday during State seasons.</p> <p>Open Prime Hook Creek on Tuesday, Thursday, and Friday (except closed on Fridays which coincide with opening days for waterfowl hunting).</p> <p>Reestablish hunting areas only for non-ambulatory hunters permanently confined to wheelchairs.</p> <p>Provide deer hunting, specifically for non-ambulatory hunters, during the firearms and muzzleloader seasons on the Island Farm area and during State deer hunting seasons in October and November only.</p> <p>Open a non-ambulatory hunt area near Prime Hook Beach on Tuesday, Thursday, and Friday throughout the State firearms and muzzleloader deer hunting season (except closed on Fridays which coincide with opening days for waterfowl hunting).</p> <p>Check-in and check-out is not required except for use of the hunt blinds in the non-ambulatory hunt area (near Prime Hook Beach).</p> <p>Same as alternative A</p> <p>Open 1,732 additional acres for waterfowl hunting, for a total of 3,455 acres, equivalent to 40 percent of the refuge (the maximum allowed).</p> <p>Hunting will be permitted (3 days/vwk) on Monday, Wednesday, and Saturday during the State waterfowl season in the waterfowl lottery hunt area and the non-ambulatory hunt area (except open on Fridays which coincide with opening days).</p>	<p>Same as alternative B</p> <p>Same as alternative B</p> <p>Close refuge headquarters area for 1 day to all visitors during scheduled hunts.</p> <p>Same as alternative A</p> <p>In regular/non-lottery deer hunting areas, reduce hunting from everyday during the State season to 3 days per week (Tuesday, Thursday, and Friday).</p> <p>Same as alternative A</p> <p>Same as alternative B</p> <p>Same as alternative B</p> <p>Same as alternative B</p> <p>Same as alternative B</p> <p>Reduce the headquarters lottery deer hunt to 1 day.</p> <p>Open 1,150 additional acres for waterfowl hunting, for a total of 2,873 acres.</p> <p>Same as alternative B</p>
Waterfowl Hunting	Continue to provide waterfowl hunting on 1,723 acres.	Open 1,732 additional acres for waterfowl hunting, for a total of 3,455 acres, equivalent to 40 percent of the refuge (the maximum allowed).	Hunting will be permitted (3 days/vwk) on Monday, Wednesday, and Saturday during the State waterfowl season in the waterfowl lottery hunt area and the non-ambulatory hunt area (except open on Fridays which coincide with opening days).

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Waterfowl Hunting (cont.)	Salt marsh areas in Unit 1 remain closed to waterfowl hunting. Salt marsh areas in Unit 4 remain closed to waterfowl hunting. Prime Hook Creek remains closed to waterfowl hunting.	Open non-lottery/first come first served waterfowl hunting in salt marsh areas in Unit I. Hunting will be permitted (6 days/wk) on Monday through Saturday. Open non-lottery/first come first served waterfowl hunting in salt marsh areas in Unit IV. Hunting will be permitted (6 days/wk) on Monday through Saturday.	Open non-lottery/first come first served waterfowl hunting in salt marsh areas in Unit I. Hunting will be permitted (3 days/wk) Monday, Wednesday and Saturday.
	Currently, late season snow geese, resident Canada geese, and early teal hunting are closed. Currently, there are no regular/non-lottery waterfowl hunt areas.	Open waterfowl hunting on Prime Hook Creek on Monday, Wednesday, and Saturday (except open on Fridays which coincide with opening days). Establish hunting opportunities for late season snow geese, resident Canada geese, and early teal.	Same as alternative A
	All hunting closes at 3:00 pm. Currently, there is no preseason lottery drawing.	Hunting will be permitted (6 days/wk) Monday through Saturday in the regular/non-lottery waterfowl hunting areas. All hunting closes at noon.	Same as alternative A
	Continue to facilitate daily standby lottery drawings to issue hunt permits on the current lottery hunt area.	Institute a preseason lottery drawing. Preseason lottery hunt opportunities not claimed in preseason drawing will be available throughout the season either online or by telephone. Blind sites not reserved on the online reservation system will go vacant. Blind sites reserved but not claimed the morning of the hunt will remain vacant for the day.	Same as alternative B
	Continue to require hunters to hunt from grassed and maintained permanent blinds on the lottery hunt area, including 19 Federal, 8 State, and 1 wheelchair-accessible blind for disabled hunters only	Eliminate daily standby drawings. Conduct preseason lottery drawings for the lottery waterfowl hunt area.	Same as alternative B
	Continue managing Unit II as a waterfowl sanctuary.	Phase out permanent blind structures over a 5-year period in the current lottery hunt area. Instead, establish blind sites; increase from 19 Federal sites to 21 in lottery hunt area (Unit III marsh and Prime Hook Creek).	Same as alternative B, but decrease from 19 Federal sites to 14 in lottery hunt area (only Unit III marsh).
	No additional waterfowl sanctuaries.	Same as alternative A	Same as alternative A
	Continue special areas open to waterfowl hunters with permanent disabilities. A permanent disability is defined as a permanent physical, mental, or sensory impairment that substantially limits one or more major life activities, such as caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working.	Manage additional waterfowl sanctuaries in portions of Unit III and Vergie's Pond in Unit IV. Reestablish hunting areas only for non-ambulatory hunters permanently confined to wheelchairs.	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Waterfowl Hunting (cont.)	Continue to provide hunting for disabled hunters in the Island Farm Area during selected days throughout the entire waterfowl hunting season. Check-in and check-out is required for all hunts.	Close the Island Farm area to waterfowl hunting. Enhance waterfowl hunting opportunities, specifically for non-ambulatory hunters, by permitting hunting in the non-ambulatory hunt area (near Prime Hook Beach) on Monday, Wednesday, and Saturday throughout the hunting season (except open on Fridays which coincide with opening days). Establish a memorandum of agreement with the Delaware Division of Fish and Wildlife to manage waterfowl hunting program in the Prime Hook Wildlife Area.	Same as alternative B Same as alternative B
	Continue to provide youth opportunities by participating in the statewide youth waterfowl hunt and young waterfowler program.	Same as alternative A	Same as alternative A
Upland Game and Webless Migratory Bird Hunting	Continue to provide upland game and webless migratory bird hunting on 1,987 acres. Continue self service check-in and check-out permitting system. Continue to require non-toxic shot. Continue to prohibit the hunting of squirrels.	Same as alternative A, except areas open to dove hunting decrease by 105 acres. Check-in and check-out is not required. Same as alternative A Same as alternative A	Same as alternative B Same as alternative B Same as alternative B Same as alternative A Same as alternative A
Turkey Hunting	Turkey hunting will remain closed.	Provide a quality wild turkey hunt program in partnership with the Delaware Division of Fish and Wildlife after determining if a huntable population is present. Open 3,472 acres for turkey hunting. Turkey hunting will remain closed.	Work with Delaware Division of Fish and Wildlife to annually evaluate the program and turkey populations, and to conduct outreach and enforcement. Turkey hunting will remain closed.
	Turkey hunting will remain closed.	Conduct a preseason lottery drawing for a limited number of hunters for the turkey lottery hunt area, which will be administered by the State. Turkey hunting will remain closed.	Same as alternative A Same as alternative A
	Turkey hunting will remain closed.	Check-in and check-out is not required. Require non-toxic shot.	Same as alternative A Same as alternative A
Wildlife Observation and Photography	Continue to maintain 5 miles of hiking trails, 7 miles of canoe trail, Slaughter Canal, and roadside pull-offs along Broadkill Beach Road and Prime Hook Beach Road to facilitate these activities.	Same as alternative A	Same as alternative A except close the trail and observation platform overlooking Verge's Pond on the south side of Broadkill Beach Road. Same as alternative A

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Wildlife Observation and Photography (cont.)	Continue to provide general information on opportunities via refuge Web site, general refuge brochure, maps, and kiosk maps. Continue to partner with Friends of Prime Hook, volunteers, Milton Chamber of Commerce and other partners to host special events, conduct field trips, conduct bird nestbox surveys, and assist with maintenance of trails, observation platforms, photography blinds, and benches. Continue to close headquarters area to general public access for scheduled deer hunts. Continue to close the easternmost 3 miles of Prime Hook Creek from October 1 through March 15. No action	Same as alternative A Same as alternative A Same as alternative A Close the easternmost 3 miles of Prime Hook Creek every day from September 1 through March 15. Close the westernmost 4 miles of Prime Hook Creek every day during the deer and waterfowl hunting seasons, which typically start on September 1 and end in early February. Same as alternative A Same as alternative A	Same as alternative A Same as alternative A Same as alternative A Same as alternative B Same as alternative A Same as alternative A
	Continue to require a \$1 daily boat launch fee at refuge boat ramps.	Eliminate boat launch fee.	Same as alternative A
	Establish a memorandum of agreement with Delaware Division of Fish and Wildlife to manage public use along Prime Hook Creek adjacent to the Prime Hook Wildlife Area.	Same as alternative A	Same as alternative A
	No action	Expand program by creating new, quality, self-guided opportunities for wildlife observation and photography by using existing trails and interior roads. These include opening the following new areas: North of Fowler Beach Road, South of Slaughter Beach Road, South of Fowler Beach Road (includes new wheelchair-accessible photo blind), Deep Branch Road Trail, South of Prime Hook Road, and expand and improve Blue Goose Trail.	Same as alternative A
	Provide area-specific seasonal closures to reduce user conflicts and minimize wildlife disturbance.	Provide area-specific seasonal closures to reduce user conflicts and minimize wildlife disturbance. Most areas would be open only on Sundays during designated hunting seasons.	Same as alternative A
	No action	Develop an interpretive auto tour route using advanced technology, such as radio, downloadable programming, etc., to provide visitors with interpretive information while traveling along the refuge's roadways.	Same as alternative B
	No boat ramp provided at the old maintenance facility.	Provide new opportunities for guided field trips featuring nature, birding, fishing, etc.	Same as alternative A
		Within 5 years of the plan, open a boat ramp at the old maintenance facility for access to Prime Hook Creek.	Same as alternative A

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Recreational Fishing and Crabbing	Continue to provide fishing and/or crabbing opportunities at Turkele Pond, Fleetwood Pond, Prime Hook Creek, Petersfield Ditch, Slaughter Canal, Fowler Beach, and Slaughter Creek in conformance with State seasons and bag limits.	Same as alternative A. In addition, expand fishing opportunities to include night fishing at Fowler Beach and portage-in fishing at Goose and Flaxhole Ponds.	Same as alternative A
No action		Adopt catch-and-release regulations for Turkele Pond, Fleetwood Pond, Goose Pond, Flaxhole Pond, and Prime Hook Creek.	Adopt catch-and-release regulations for Turkele Pond, Fleetwood Pond, and Prime Hook Creek.
No action		Require the use of barbless hooks in catch-and-release fishing areas.	Same as alternative B
Continue to close the easternmost 3 miles of Prime Hook Creek from October 1 through March 15.		Close the easternmost 3 miles of Prime Hook Creek every day from September 1 through March 15.	Same as alternative B
No action		Close the westernmost 4 miles of Prime Hook Creek every day during the deer and waterfowl hunting seasons, which typically start on September 1 and end in early February.	Same as alternative A
		Same as alternative A and require manual propulsion only in Goose and Flaxhole Ponds.	Same as alternative A
		Same as alternative A	Same as alternative A
		Eliminate boat launching fees.	Same as alternative A
		Same as alternative A	Same as alternative A
		Same as alternative A	Same as alternative A
		Same as alternative A	Same as alternative A
		Establish a memorandum of agreement with Delaware Division of Fish and Wildlife to manage public use along Prime Hook Creek adjacent to the Prime Hook Wildlife Area.	Same as alternative A

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Recreational Fishing and Grabbing (cont.)	Follow State fishing regulations.	Same as alternative A with the following exceptions: <ul style="list-style-type: none"> • no recreational gill netting • no commercial fishing • no food fishing with equipment other than hook and line • no crabbing using pots or trot lines (collapsible traps permitted if attended to at all times) 	Same as alternative B
	Continue to survey fish populations in refuge waterways.	Survey fish populations every 5 years in refuge waterways and provide appropriate management recommendations (more restricted creel or size limits, seasonal closures, etc.).	Same as alternative A
	Provide area-specific seasonal closures to reduce user conflicts and minimize wildlife disturbance.	Provide area-specific seasonal closures to reduce user conflicts and minimize wildlife disturbance. Most areas would be open only on Sundays during designated hunting seasons.	Same as alternative B
	No boat ramp provided at old maintenance facility.	Within 5 years of the plan, open a boat ramp at the old maintenance facility for access to Prime Hook Creek.	Same as alternative A
Environmental Education	Continue to respond to requests for onsite field trips and offsite environmental education programs when staffing and funding allow.	Same as alternative A	Same as alternative A
	Continue to plan, develop, and implement quality educational programs on the refuge that meet or exceed State-mandated curriculum standards.	Same as alternative A	Same as alternative A
	Continue to work with friends group, volunteers, and other partners to implement programs.	Same as alternative A	Same as alternative A
	No action	Expand the visitor contact station/refuge office to support environmental education and visitor services programs.	Same as alternative B
	Continue partnerships and formalize relationships with environmental education agencies and academic institutions to develop a network of educators willing to develop curriculum-based lessons focused on refuge resources.	Expand partnerships and formalize relationships with environmental education agencies and academic institutions to develop a network of educators willing to develop curriculum-based lessons focused on refuge resources.	Same as alternative B
	No action	Develop a partnership with a local school district or NGO to provide funding (full- or part-time) for an onsite education specialist to coordinate the development and implementation of curriculum based environmental education programs. Evaluate potential for adult educational partnerships through universities or programs such as Elder Hostel.	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Environmental Education (cont.)	No action	In conjunction with conservation partners, develop useful and accessible information resources to help Americans fully appreciate the significant implications of sea level rise and climate change on refuge species and habitats, and to engage these constituencies in seeking solutions.	Same as alternative B
	No action	Incorporate sea level rise and climate change information and messages into environmental education programs.	Same as alternative B
	No action	Hire a temporary staffing position to assist with outreach efforts for sea level rise and climate change.	Same as alternative B
	No action	No action	Develop education programs targeting teens and young adults focusing on practical applications, such as how to make environmentally conscious decisions.
	No action	No action	Develop a program designed for those interested in education as a career and give participants an opportunity to be involved in planning and implementing youth environmental education programs.
Interpretation	Continue to respond to requests for onsite and offsite interpretive programs when staffing and funding allows.	Same as alternative A	Same as alternative A
	Continue to partner with Friends of Prime Hook, volunteers, Milton Chamber of Commerce, and other partners to host special events, conduct interpretive programs, develop signage, etc.	Same as alternative A	Same as alternative A
	Continue to conduct offsite interpretive opportunities annually for civic groups, conservation organizations, and community events.	Same as alternative A	Same as alternative A
	Continue to provide interpretive displays, movies, and various mounted species or animals found on the refuge at the visitor contact station and auditorium.	Same as alternative A	Same as alternative A
	Continue to provide self-guided information along hiking and canoe trails.	Same as alternative A	Same as alternative A
	Maintain refuge Web site.	Same as alternative A	Same as alternative A
	No action	Increase interpretive programs by providing more regularly guided field trips for nature, birding, fishing, photography, etc.	Same as alternative B
	No action	Develop new interpretive panels and maps for the information kiosks located throughout the refuge.	Same as alternative B
	No action	Develop new and improved brochures for the refuge's general brochure, hunting regulations, and a tear sheet with public use regulations.	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Interpretation (cont.)	No action	Revitalize the waterfowl festival celebrating National Wildlife Refuge Week in October only if additional staff is available.	Same as alternative A
	Conduct routine condition review of interpretive signs and information kiosks and complete maintenance and sign replacement as needed.	Same as alternative A	Same as alternative A
	No action	Develop an interpretive auto tour route using advanced technology, such as radio, downloadable programming, etc., to provide visitors with interpretive information while traveling along the refuge's roadway.	Same as alternative B
	No action	Explore other partnerships to develop programs for various age groups.	Same as alternative B
	No action	No action	Develop three to five power point programs that focus on different themes associated with refuge goals and objectives such as habitat, wildlife, and visitor services.
	No action	No action	Develop an educational power point that plays continuously in the visitor contact station informing the public on topics such as the history of the refuge, types of habitat present, upcoming events and activities, and volunteer opportunities.
	No action	No action	Develop a new display(s) in the visitor contact station promoting backyard habitat and the importance of native species.
	No action	No action	Implement a volunteer master naturalist program.
	No action	In conjunction with conservation partners, develop useful and accessible information resources to help Americans fully appreciate the significant implications of sea level rise and climate change on refuge species and habitats, and to engage these constituencies in seeking solutions.	Same as alternative B
	No action	Incorporate sea level rise and climate change information and messages into interpretive sign panels, brochures, and websites.	Same as alternative B
	No action	Hire a temporary staffing position to assist with outreach efforts for sea level rise and climate change.	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Other Recreational Use	Allow non-priority compatible uses: research, mosquito control, public leases of the FAA VORTAC tower, canoeing, walking, hiking, jogging, and specialized uses such as commercially guided tours for wildlife observation and continuing education.	Same as alternative A	Same as alternative A
	Allow non-priority compatible uses: commercial fishing; commercial trapping of muskrat, raccoon, etc.; turtle trapping; picnicking; 5K road race; beekeeping; waterfowl retrieval permits; dog walking; roller blading; competitions or organized group events; and non-competitive organized events.	Prohibit the activities in alternative A	Prohibit the activities in alternative A
	No action	Allow non-priority compatible uses: commercial photography and commercial forest management.	Same as alternative B
	Prohibit the following inappropriate or non-compatible activities: recycling trash using State-sponsored recycle containers located on the refuge, ice skating, camping, horseback riding, geocaching, metal detecting, off-road and mountain biking, off-road vehicles including ATVs, commercial dog walking, operation of model boats and airplanes, swimming and sunbathing, waterskiing, personal watercraft, air thrust boats, soliciting of funds (50CFR 27.97 for private operations and per 50CFR 27.86 for begging), and other activities identified in 50CFR part 27.	Same as alternative A	Same as alternative A
Community Outreach	Adhere to commercial wildlife observation guide program stipulations found in appendix E.	Same as alternative A	Same as alternative A
	Continue to conduct outreach in conjunction with interpretive programs under goal 5.	Increase outreach in conjunction with interpretive programs.	Same as alternative B
	Continue to issue news releases on significant accomplishments, to promote special events, and to announce major initiatives.	Same as alternative A	Same as alternative A
	Continue to maintain refuge Web site and also post information on refuge kiosks.	Same as alternative A	Same as alternative A
	Continue to coordinate, co-host, and/or partner with local Chambers of Commerce and friends group to conduct annual community events.	Same as alternative A	Create new and improve existing outreach materials (Web site, media and press kits, fact sheets, virtual tours of the refuge, and Webcam for wildlife).
	No action	No action	Same as alternative B
	No action	No action	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Community Outreach (cont.)	No action	Coordinate with Delaware Division of Fish and Wildlife and other partners to develop outreach materials better explaining the refuge's water level management, other habitat management programs, and visitor services programs.	Same as alternative B
	No action	Conduct meetings as needed with the general public to facilitate communications, raise awareness and understanding of, and seek support for, refuge management programs.	Same as alternative B
	No action	Incorporate sea level rise and climate change information and messages into interpretive sign panels, brochures, Web sites, and environmental education programs.	Same as alternative B
	No action	Hire a temporary staffing position to assist with outreach efforts for sea level rise and climate change.	Same as alternative B
	No action	Work with regional and State partners to develop a common, consistent message for sea level rise and climate change.	Same as alternative B
	No action	No action	Develop a comprehensive outreach strategy.
	No action	No action	Allow visitors to register for upcoming activities and events online.
	No action	No action	Utilize new technology such as Twitter and Facebook.
	No action	No action	Conduct an evaluation of the effectiveness of current outreach techniques and identify at least two specific audiences for outreach goals that have thus been unexplored.
Private Landowner Assistance	Continue to assist private landowners and other cooperators in controlling <i>Phragmites</i> on their lands. Assistance includes on-the-ground support, as well as seeking grants and other funding sources.	Same as alternative A	Same as alternative A
	No action	Expand technical assistance capability to assist landowners on invasive species identification and control, wetlands protection, and habitat restoration and management.	Same as alternative A
	No action	Work with partners to identify how key ecological processes are likely to be affected by climate change.	Same as alternative B
	No action	Determine how management actions might help to maintain or restore key ecological processes using the various incentive programs offered by Federal and State agencies and other conservation organizations.	Same as alternative B

	Alternative A Current Management	Alternative B Focal Species and Proactive Habitat Management (Service-preferred Alternative)	Alternative C Return to Historic Habitat Management, with Modified Public Use
Regional and Community Partnerships	<p>Continue to maintain the collaborative relationship with Federal, State, and local governmental agencies to meet natural resource mandates and objectives.</p> <p>Continue to work with the Friends of Prime Hook to promote an appreciation of natural and cultural resource conservation and stewardship and to assist in funding and implementing refuge projects through the approved memorandum of agreement.</p> <p>Continue to administer a program that actively engages volunteers in the biological, maintenance, and visitor services program areas each year in carrying out the mission of the Service and Refuge System.</p> <p>Continue to conduct wildlife and habitat research studies through partnerships with local universities.</p> <p>No action</p>	<p>Enhance our existing collaborative relationships, and seek additional ones, to increase the likelihood of meeting natural resource mandates and objectives.</p> <p>Same as alternative A</p> <p>Same as alternative A</p> <p>Same as alternative A</p> <p>Same as alternative A</p>	<p>Same as alternative B</p> <p>Same as alternative A</p> <p>Same as alternative A</p> <p>Same as alternative A</p>
	<p>Update the existing memorandum of agreement with the friends group.</p> <p>No action</p>	<p>Same as alternative A</p> <p>Develop a refuge volunteer plan and handbook that covers volunteer program coordination, training, job descriptions, volunteer policy, recruitment policy, monitoring, evaluation, dispute, and termination policies.</p>	<p>Same as alternative A</p> <p>Same as alternative B</p>
	<p>Continue the resident camper volunteer program on the refuge.</p> <p>No action</p>	<p>Expand the resident camper volunteer program on the refuge.</p> <p>Explore the possibility of permanent housing for refuge interns.</p>	<p>Same as alternative B</p> <p>Same as alternative B</p>
	<p>No action</p>	<p>Facilitate demonstration areas on-refuge and on other conservation ownerships that showcase applied management to benefit natural resources.</p>	<p>Work with Federal, State, and conservation organizations on land acquisition priorities.</p>
	<p>No action</p>	<p>Enhance existing and develop new partnerships to conduct research related to fish and wildlife adaptation to climate change and sea level rise on the refuge, neighboring watersheds, and elsewhere in the State of Delaware.</p>	<p>Same as alternative B</p>
	<p>Continue implementing tasks outlined in a 5-year cooperative agreement with the Delaware Coastal Program on research and monitoring needs for the refuge.</p>	<p>Same as alternative A</p>	<p>Same as alternative A</p>